



**UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

**MCB TRIP MONITORING SYSTEM**

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Engineering Technology (Industrial Power) (Hons.)

by

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## BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

TAJUK: **MCB TRIP MONITORING SYSTEM**

SESI PENGAJIAN: **2014/15 Semester 2**

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## **DECLARATION**

I hereby, declared this report entitled “MCB TRIP MONITORING SYSTEM” is the results of my own research except as cited in references.

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**Date** : **9 DISEMBER 2016**

## **APPROVAL**

This report is submitted to the Faculty of Engineering Technology of UTeM as a partial fulfillment of the requirements for the degree of Bachelor of Engineering Technology (Type your department's name here) (Hons.). The member of the supervisory is as follow:

.....  
(Project Supervisor)

.....  
(Project Co-Supervisor)

## **ABSTRACT**

This project proposes the development of MCB Trip Monitoring System that utilizes GSM (Global System for Mobile Communications). This project is designed to assist the maintenance crew to gain preliminary information about the breakdown even at times they are not there. It also can send SMS updates every 30 minutes to inform and provide a periodically status of the machine This project has been designed according to its objective; to design MCB Trip Monitoring System equipped with GSM capability; to develop hardware and software using GSM module integrated with PIC microcontroller; to develop hardware and software interfacing using the PIC microcontroller; to analyse the system performance using SMS. A study regarding PIC microcontroller, GSM module, USART, MAX232 needs to be done. Proteus 8.0 Professional is used as a simulation software to create the circuit and troubleshoot in simulation stage. It is required to undergo simulation and prototype testing before it is implemented and tested in real model. One of the advantages of using GSM technology is that it can enable remote control of the device.

## **ABSTRAK**

Projek ini mencadangkan pelaksanaan Sistem Pemantauan Lantunan MCB menggunakan sistem komunikasi mudah alih global. Projek ini direka untuk membantu pekerja mendapatkan gambaran awal berkaitan dengan informasi kerosakan yang berlaku biarpun mereka tidak berada di sana. Sistem ini juga mampu menghantar SMS tentang status mesin setiap 30 minit dan secara berkala. Projek ini direka berdasarkan objektifnya; untuk menghasilkan Sistem Pemantauan Lantunan MCB menggunakan keupayaan sistem komunikasi mudah alih global; untuk menghasilkan perkakasan dan perisian bersepadu dengan pengawal PIC; untuk menganalisa keupayaan sistem menggunakan SMS. Kajian berkaitan pengawal PIC, modul GSM, USART, MAX232 perlu dilakukan. Proteus 8.0 Professional digunakan sebagai perisian simulasi untuk menghasilkan litar. Projek ini akan melalui proses simulasi dan ujian prototaip sebelum digunakan pada model sebenar. Salah satu kelebihan menggunakan teknologi GSM ialah ia membolehkan peralatan dikawal dari jarak jauh.

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Special thanks to my family especially Mami and Ayah

Special thanks to my supervisor, Puan Intan Mastura

Special thanks to colleagues, especially Fatin Nabilah

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## LIST OF SYMBOLS AND ABBREVIATIONS

ARFCN	=	Absolute Radio Frequency Chaneel Number
ASCII	=	American Standard Code for Information Interchange
AT	=	Attention
ATA	=	Actual Time Of Arrival
ATD	=	Actual Time Of Departure
ATH	=	Audio Technical
ATO	=	Auto Top Of System
BSC	=	Base Station Controller
BTS	=	Base Transmission Station
EEPROM	=	Electrically Erasable Programmable Read Only Memory
ETSI	=	European Telecommunication Standards Institute
GPP	=	Generation Partnership Project
GSM	=	Global System for Mobile Communication
HLR	=	Home Location Register
IC	=	Integrated Circuit
ISIS	=	Intelligent Schematic Input System
ITU-T	=	Telecommunication Standardization Sector
LCD	=	Liquid Crystal Display
MAP	=	Mean Arterial Pressure
MCU	=	Microcontroller Unit
MCB	=	Main Circuit Breaker



MS	=	Mobile Station
MSC	=	Mobile Switching Centre
PCB	=	Printed Circuit Board
PDU	=	Protocol Data Unit
PIC	=	Programmable Interface Controller
POTS	=	Plain Old Telephone Service
PSTN	=	Public Switched Telephone Network
PWM	=	Pulse Width Modulation
RAM	=	Random Access Memory
SIM	=	Subscriber Identity Module
SMS	=	Short Messaging Service
SMSC	=	Short Messaging Service Centre
SPI	=	Serial Peripheral Interface
SS7	=	Signalling System No. 7
UCS	=	Universal Character Set
UART	=	Universal Asynchronous Receiver/Transmitter
USART	=	Universal Synchronous/Asynchronous Receiver/Transmitter
3GPP	=	Third Generation Partnership Project

# CHAPTER 1

## INTRODUCTION

### 1.0 Introduction

This chapter will discuss briefly the overview of this project such as introduction, objectives, problem statement, and scope of work, methodology and thesis outlines.

### 1.1 Background

This task proposes the improvement of a Miniature Circuit Breaker (MCB) Trip Monitoring System that utilizes Global System for Mobile Communications (GSM) Network. This system helps cell phone to receive data on excursion MCB in control panel when the fault happens. This project will be capable to give data which MCB is faulted. In addition this project will be able to display the fault information on the display device. MCB Trip Monitoring System generally has numerous more muddled system, the truth of the matter is they all work by means of the same essential standards.

MCB Trip Monitoring System works were genuinely straightforward arrangement of Microcontroller and Short Message Service (SMS). All devices in a standard tower crane such as motor systems, monitoring systems, and inverter and computer systems are outfitted with a system to transmit and receive signals. This Microcontroller recognizes a certain signal started by the deficiency, which can be utilized as a part to transmitting SMS.

In order to design the MCB Trip Monitoring System, this system can deliver a precise data of the deficiency as the SMS. These days, SMS is broadly utilized as a type of data communication. It is around 2.4 billion dynamic clients which is equivalent to 74% of cellular telephone endusers sending and getting text messages on their telephones. SMS is

a communication application in GSM system. It permits the trade of short message between cell phone device utilizing institutionalized communication protocols. The system in this project is intended to transmit the SMS from GSM modem associated with microcontroller to any cell phone accessible.

## **1.2 Problem Statement**

Nowadays, many skyscraper buildings have been built. One of the most crucial machines in construction of high building is tower crane. Tower crane height can be as low as 20 meters and be as high as hundred meters. Due to its height, maintenance and troubleshooting of the tower crane consume a long period. This will cause delay in construction schedule and can cost the company ten thousands of money.

During breakdown, maintenance crew has to climb up all the way to the top just to find out what causes the breakdown. When the problem is identified, the crew has to climb down again just to take replacement part. This is very time consuming and increases the risk of accident to occur due to the frequency of the maintenance crew climbing up and down. This problem has arisen a demand to a device that can notify the maintenance crew about the problem to minimize the frequency of the crew climbing up and down. Hence minimizing risk of injury as well as saving the time and cost.

## **1.3 Objective of Project**

- 1) To design MCB Trip Monitoring System equipped with GSM capability.
- 2) To develop a GSM module integrated with PIC Microcontroller for the system.
- 3) To analyse the system performance via SMS

## 1.4 Project Work Scope

In order to ensure this project flow according to its objectives, several work scopes must be done. All this work scope and plan must be done within the project area. Below are the list of the project work scope:

- 1) Study on the information the GSM network via SMS.
- 2) Deal with connection I/O of GSM.
- 3) Test runs & troubleshoot the program.
- 4) Link the hardware and the software.

## 1.5 Project Methodology

**Stage 1:** Do a literature review for the project system by studying the attribute of the components that will be utilized and comprehend the operation of the circuit.

**Stage 2:** The following methodology is to plan how the undertaking or issue figured was composed and conceivable arrangement is orchestrated methodically

**Stage 3:** The task is then differentiated into two sections; hardware design and software design. The Proteus software has been selected in the circuit design, while the PIC2kit is to program the PIC using assembly language.

**Stage 4:** The final circuit design, and then finally to be imprinted on the PCB and unit test are performed to guarantee that it is lapse free then final testing to indicate the integration is free from error. Troubleshooting activity executes if an error is encountered.

## 1.6 Thesis Outline

This thesis paper contains five specific chapters. The following describe chapters are the thesis outline for MCB Trip Monitoring System development.

**Chapter I:** Overview of this project will be discussed briefly regarding the project introduction, objectives, problem statement, project work scope, project methodology and thesis outline.

**Chapter II:** This chapter includes the study on related articles or publications. It also consists of the study of any important details or concept that will be applied in the MCB Trip Monitoring System. Any information regarding the study of any equipment, components and designs that will be used in this thesis will be displayed in this chapter. Simulation and programming software used in designing the MCP Trip Monitoring System also included in this chapter.

**Chapter III:** This chapter will discuss more detail and overall of the project methodology utilized in designing, simulating, and programming. Each one of this methodology must be fulfilled in order to achieve a good and smooth flow of the thesis development.

## **1.7 Result Expectation**

This project will be able to monitor the MCB trip status using GSM to deliver SMS when a fault occurs. It also can produce an effective system performance in timely response to deliver SMS. The software and hardware of this system can operate well using the PIC microcontroller. This project will help the maintenance crew to quickly identify the problem occurred in just a few minutes after it happens. Besides that, this project also can reduce the frequency for the maintenance crew to climb up and down of the tower crane. It also can reduce the risk of accident from happening to the crew due to fatigue of climbing. This project also can reduce time for maintenance and troubleshooting of the breakdown and also can reduce the operation cost (as described in problem statement).

# **CHAPTER 2**

## **LITERATURE REVIEW**

### **2.0 Introduction**

This chapter contains research and information on the project to several important concepts in information systems failure of electrical power supply, technology and materials to be applied in this project. This literature review consists of the details of software and hardware description of electrical power supply.

### **2.1 Introduction Literature Review**

This area gives a past investigation of related work with respect to the use of SMS services in a different field. Some past inquiries about have been examined to acquire data about current existing GSM control system that was previously used. It is important to know and see how the product and equipment were utilized as a part of the SMS controlled system improvement. This is to guarantee that the study that presently being directed, contribute at a certain level of use therefore it turn out to be more effective and reasonable.

### **2.2 Related Work**

#### **2.2.1 Fault Sensing in A Remote Transformer using GSM & Automatic On/Off of streets Lamps.**

N.Nagaraju, M.S.Kiruthika (2013). Monitoring and controlling the devices using networked embedded systems has become essential these days. The improvements of residential gateway and automation systems is an outcome of an advances in embedded system technologies. Aside from continuous power cuts, neighbourhoods experience the ill effects of a difficult issue that individuals are not mindful about the power cut because of power disconnections in the transformers, also power burglary issues and power wastage in

the road lights amid a day time exists. So this paper presents a lifestyle system using GSM, which transmits the status of the transformer.

### **2.2.2 GSM Based Automatic Trip Control System for Energy Management**

S.Sukhumar, P.Mukesh Aravind, L.Manivannan, P.Naveen Kumar, N.Suthanthira Vanita (2013). The Automatic Trip Control System for Energy Management using GSM monitors the usage intensity of electricity of every consumer continuously. During abundance of electrical energy utilized by the customer, the system will give the alerts through an alarm circuit. After the alarm circuit triggered, the consumer needs to take an alternative solution to cut off overabundance supply from the Electricity Board (EB) to stop the alarm circuit. If the consumer ignore the alarm, the circuit breaker will come into OFF position and the incoming supply will be cut off from EB. The data about the specific consumer will be sent to EB through GSM. Then, the consumer needs to give the order to EB to reset circuit breaker into a normal state with the assistance of the PIC microcontroller, which is programmed to observe the parameters of electrical energy. This system helps for unlawful use of electricity, observing the energy. The execution and demonstration of the system were made.

### **2.2.3 Microcontroller Based Substation Monitoring and Control System with GSM Modem**

Amit Chan (2012). The main purpose of this project is to acquire the electrical data on Voltage (V), Current (A) and Frequency (Hz) and deliver this data to the GSM system utilizing GSM Modem/telephone at the power station. It is additionally intended to secure the electrical equipment by working an electromagnetic relay. This relay gets initiated at whatever point the electrical data surpass the set limit. The relay can be utilized to work a circuit breaker to turn off the primary electrical supply.

Users are able to deliver commands in the form of SMS messages to peruse the electrical data. This project additionally is able to consequently deliver the ongoing electrical data occasionally, (in view of time settings) as SMS. Whatever point the circuit breaker trips

or at whatever point the voltage or current surpasses predefined limits, this system are able to deliver SMS alerts to users.

The system utilizes an on-board computer which is ordinarily known as a microcontroller. Microcontroller can productively interact with the distinctive sensors that now has been utilized. In order to keep or save the code, the microcontroller is given internal memory. The memory is utilized to leave some instruction in the controller. Also, the controller operation is reliant on these assembly instructions. The controller is programmed by utilizing C language.

#### **2.2.4 GSM Baseed Automated Embedded System for Monitoring and Controlling of Smart Grid**

Amit Chan (2012). The main purpose of this project is to acquire the electrical data on voltage (V), Current (A) and Frequency (Hz) and deliver this data to the GSM system utilizing GSM Modem/telephone at the power station. It is additionally intended to secure the electrical equipment by working an electromagnetic relay. This relay gets initiated at whatever point the electrical data surpass the set limit. The relay can be utilized to work a circuit breaker to turn off the primary electrical supply. Users are able to deliver commands in the form of SMS messages to peruse the electrical data. This project additionally able consequently delivers the ongoing electrical data occasionally (in view of time settings) as SMS. Whatever point the circuit breaker trips or at whatever point the voltage or current surpasses predefined limits, this system are able to deliver SMS alerts to users.

### **2.3 GSM Modem**

#### **2.3.1 Introduction to GSM**

GSM stands for Global System for Mobile Communications. GSM is used in all mobile phone telecommunication internationally. Sitaram *et al.* (2013, p76) GSM module is used to establish communication between a computer and a GSM system. For purpose to cater voice call service and data usage used in digital modulation second generation of