



# **UNIVERSITI TEKNIKAL MALAYSIA MELAKA**

## **RCCB CONTROL FOR HOME USING GSM**

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

by

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**BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA**

**TAJUK RCCB CONTROL FOR HOME USING GSM**

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

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## DECLARATION

I hereby, declared this report entitled **-RCCB CONTROL FOR HOME USING GSM** ” is the results of my own research except as cited in references.

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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 of Bachelor of Engineering Technology (Electronic Industry) (Hons.). The member of the supervisory is as follow:

.....  
(Project Supervisor)

## ABSTRACT

This project also proposed for people leaving their house for a few days make us worried about what has been left in the house especially when lightning trip the electricity from some important electrical appliances such as fridge and aquarium. So this project also present to design for backup the electricity and give information of Residual Current Circuit Breaker(RCCB) to owner of house after earth fault(e.g Lightning) or short circuit occurs by switching on another Residual Current Circuit Breaker (RCCB) so that electricity will work as usual again. The switching can be done by using Short Messaging Service (SMS). The purpose of doing this is to avoid some important electrical appliances from being stop functioning and can be remotely control using mobile phone even outside of residential. Otherwise the owner of house can know the status of Residual Current Circuit Breaker (RCCB) that earth leakage or short circuit occurs. This project also Combination of Global System for Mobile communication (GSM) Modem with PIC16F877A microcontroller is used to perform messaging control of relay which will allow the current flow through the backup RCCB in the distribution board. The system will integrated with microcontroller and GSM network interface using C language. Proteus software will utilize to accomplish the integration. By using this system, it will save importing things that attach to the electrical appliances if the backup RCCB successfully being trigger.

# DEDICATIONS

I lovingly dedicated this Final Project Report to:

My beloved family members

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In the name of Allah S.W.T the most gracious and merciful ,praise to Allah the lord of universe and may blessing and peace of Allah be upon his messenger Muhammad S.A.W .First ,and foremost thank for giving me wellness and idea to do this project. Without any of it, I surely cannot complete this project in the time given. Alhamdulillah and grate full to all might give me opportunity and able to complete the final year project for final year student. Before complete this report i was contact with many people researches ,academician and practinoiners. They also give good recommendation and also understanding about this project.

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# Chapter 1

## INTRODUCTION

### 1.0 Introduction of the project

Many of project in the world also used applications of the Global System for Mobile communication (GSM) technology. Besides that in this project I also design Distribution Board Controller using SMS implements the emerging applications of the Global System for Mobile communication (GSM) technology .By using combination of GSM modem, PIC16F877A, and relays, it creates a control system that will act as embedded system which can monitor the situation of Residual Current Circuit Breaker (RCCB).the system also energize the backup RCCB device that placed near to the first RCCB in the distribution board if any earth faults happen to the first RCCB.this system allow users receive status of the RCCB and also can sent command via mobile phone in form of Short Message Service (SMS).The operation of this project is receiving the sent SMS and processing as required to perform the operation and give information of short circuit occur in RCCB.To continous the operation of RCCB based on users send SMS to GSM.

The Short Messages Services (SMS) in GSM allows among other the transmissions of short text messages to mobile phones. In cases of an emergency the SMS can be used to warn a large number of individual. SMS also can be used to control the some system like a control the flood warning, control the water pumps and so on. To control the system using SMS, GSM module and GSM remote control will be used.

To control devices from far distance I used GSM remote control that is because GSM remote control is wonderful device that help users control devices remotely in far distance between other control devices. For example user can control

anything from home devices such as alarm, heating, and so on, to commercial security system such as routers and server and the like can be remotely controlled.

In essence, a GSM remote control is one of the most useful things out there. It can be turned to any practical use. The unit sits on the mobile phone network and is assigned a regular mobile number accordingly. Calling this number or even send a text will engage the unit, thus giving control of the end device it is connected to.

The GSM remote control can be set up to only engage when received from authorized numbers (secure control) or from any number across the world (open access control). As such, any device can be controlled from anywhere.

This project monitors the distribution board to find out when the circuit breaker trips. When the trip and cut off supplies, GSM will send SMS notify main circuit breaker trip earth leakage or short circuit happen. Then the user can send SMS to activate the backup circuit breaker to continue to supply electricity to the house. Way to detect electricity is to use AC relay acts as a sensor.

## **1.1 Background**

Nowadays in our life we know the technology grow up very fast. Technology is a broad concept that refers to use and knowledge of tools and crafts and how these tools and crafts affect our ability to control and adapt to the environment. In human society today, technology is a result of science and engineering. We all need the technology to make our activity in everyday easier. Every second the new technology will produce. Now a day every country always keep going to do research and developing the safety, in manually or technically. It is because safety is most important for all generation. On other reason, almost every country has highly criminal force the government to reduce theft of essential items.

Most people today's have access to mobile phones and thus the world indeed has become a global village. At any given moment, any particular individual can be contacted with the mobile phone. But the application of mobile phone cannot just be restricted to sending SMS or starting conversations. New innovations and ideas can be generated from it that can further enhance its capabilities. Technologies such as Infrared, Bluetooth, etc which has developed in recent years goes to show the very

fact that improvements are in fact possible and these improvements have eased our life and the way we live. Remote management of devices is a subject of growing interest and in recent years it can be seen many systems providing such controls.

These days, apart from supporting voice calls a mobile phone can be used to send text messages as well as multimedia messages (that may contain pictures, graphics, animations, etc). Sending written text messages is very popular among mobile phone users. Instant messaging, as it is also known, allows quick transmission of short messages that allow an individual to share ideas, opinions and other relevant information. The uses of concept a system that acts a platform to receive messages that is in fact are commands sent to the system and relay will allow current flow through other circuit breakers that connected to the platform. A control system that is based on the GSM technology has been design that effectively allows control from a remote area to the desired location.

The application of the system is immense in the ever-changing technological world. It allows a greater degree of freedom to an individual to monitor and controls the distribution board. The need to be physically present at the nearer area of the distribution board is eliminated with the use of this system.

## **1.2 Problem Statement**

Electricity means *“the ability to do work”* practically. The world has been so dependent on electricity and its useful applications that it pervades all aspects of lives; in the homes, offices, industries, entertainment, Medicare and other aspects of lives; without which humans are almost crippled. It cost lots of wastage of time and money. Due to now days, there are certain people that have to working outside that required them to leave their home for more than 3 days. So, there will be no one will manually reset the circuit breaker switch if the earth fault trip it during the outstation and it also can find out the cause of trip occur. Therefore ,it is important to backup the electricity by using another RCCB backup.



By using this project it can solve problem by energize the backup RCCB using mobile phone as a remote control and SMS as the technology .It will ensure the safety of user and reduce the wastage time to repair the distibution board by manually and can know the cause of trip in distribution board.

### **1.3 Objective**

The main objective of this project is to design study and develop a system protect for distribution board. The main objective of the project is to give easier to the user far from home, office, how there can be sure their home or offices are safe. With this system can help a user to secure the building from anywhere and anytime.

- To backup electricity for important electrical appliance
- To monitoring the distribution board
- To make it easier and no longer need to manual reset
- To maintain the distribution board is safe for user
- To create a controller that is able to control of devices from one particular location

### **1.4 Scope of Project**

The system specification shows the description of the function and the performance of system and the user. The scope of my project Design Distribution Board Controller using SMS is immense. The future implications of the project are very great considering the amount of time, resources it saves and the safety that can bring along it. The project can be used as a reference or as a base for realizing a scheme to be implemented in other projects of greater level such as weather forecasting, temperature updates, device synchronization, etc. The project itself can be modified to achieve a high efficiency of distribution board system that will then create a platform for the user to interface between him and the faulty conditions.

## Chapter 2

### LITERATURE REVIEW

#### 2.0 Introduction

Residual Current Circuit Breaker (RCCB) is important equipment to protection or security must have in wiring installation for each resident building. The main mechanism in operation is tripping coil which is it can be operation either in live or off condition.

An unintentional ,electrically conducting connection between an ungrounded conductor of an elctrical circuit and the normally non current carrying conductors,metallic enclosures,matallic raceways, metallic equipment or earth. Such an imbalance may indicate current leakage thought the body of person who is grounded and accidentally touching the energized part of the circuit. A lethal shock can result from these condition.RCCB are designed to disconnect quickly enough to prevent injury caused by such shock. They are not intended to provide protection against overcurrent (overload) or short circuit condition

This RCCB will operate when current is exceeding the rating of current RCCB.This high current not flow into equipment after RCCB tripped.It will flow directly into ground by using ground rod .This ground rood must has the lower resistance it because easy to flow high current.There are two type operation for RCCB that it current operated and voltage operated.

## Features of RCCB

- Special Magnetic material and highly sensitive miniature relay is used to ensure positive detection of low Earth leakage current.
- High quality thermoset insulating fire retardant Housing
- Reliable mechanical operation
- Incorporated advanced neutral hence suitable for as a Main switch
- Fast acting and long life trip free mechanism
- High contact life
- Ease of Mounting and cabling

ELCB operate by measuring the current balance between two conductors using a differential current transformer. The device will open its contacts when it detects any difference in current between the line conductor and the neutral conductor. The supply and return currents must sum to zero, otherwise there is a leakage of current to somewhere else (to earth/ground, or to another circuit, etc.)

ELCB is designed to prevent electrocution by detecting the leakage current, which can be far smaller (typically 5-30 mill amperes) than the currents needed to operate conventional circuit breakers or fuses (several amperes). RCD (Residential Current Device) are intended to operate within 25-40 milliseconds, before electric shock can drive the heart into ventricular fibrillation, the most common cause of death through electric shock.

## The Difference between RCCB and ELCB

- ELCB is the old name and often refers to voltage operated devices that are no longer available and it is advised you replace them if you find one.
- RCCB or RCD is the new name that specifies current operated (hence the new name to distinguish from voltage operated).
- The new RCCB is best because it will detect any earth fault. The voltage type only detects earth faults that flow back through the main earth wire so this is why they stopped being used.
- The easy way to tell an old voltage operated trip is to look for the main earth wire connected through it.
- RCCB will only have the line and neutral connections.
- ELCB is working based on Earth leakage current. But RCCB is not having sensing or connectivity of Earth, because fundamentally Phase current is equal to the neutral current in single phase. That's why RCCB can trip when the both currents are deferent and it withstand up to both the currents are same. Both the neutral and phase currents are different that means current is flowing through the Earth.
- Finally both are working for same, but the thing is connectivity is difference.
- RCD does not necessarily require an earth connection itself (it monitors only the live and neutral).In addition it detects current flows to earth even in equipment without an earth of its own.
- This means that an RCD will continue to give shock protection in equipment that has a faulty earth. It is these properties that have made the RCD more popular than its rivals. For example, earth-leakage circuit breakers (ELCBs) were widely used about ten years ago. These devices measured the voltage on the earth conductor; if this voltage was not zero this indicated a current leakage to earth. The problem is that ELCBs need a sound earth connection, as does the equipment it protects. As a result, the use of ELCBs is no longer recommended.

## 2.1 Voltage Operated

This circuit breaker voltage types is operating with increasing for metal shelter cause of current earth leakage .When earth leakage current flow,potential for metal shelter works will increase because of impedance earth damage short coil.This potential will make the current throught tripping coil for Residual Current circuit breaker to elctrode ground .Figure 2.1 show the circuit of Residual Current Circuit Breaker Voltage Operate.

The maximum potential is used for running this residual current circuit breaker not exceeds to 40 Volt RMS. in order that hazard of shock will decrease to minimum. However, the user used RCCB voltage types not allow to use it from Jabatan Bekalan Elektrik (JBE) because of this RCCB not suitable and less detect.

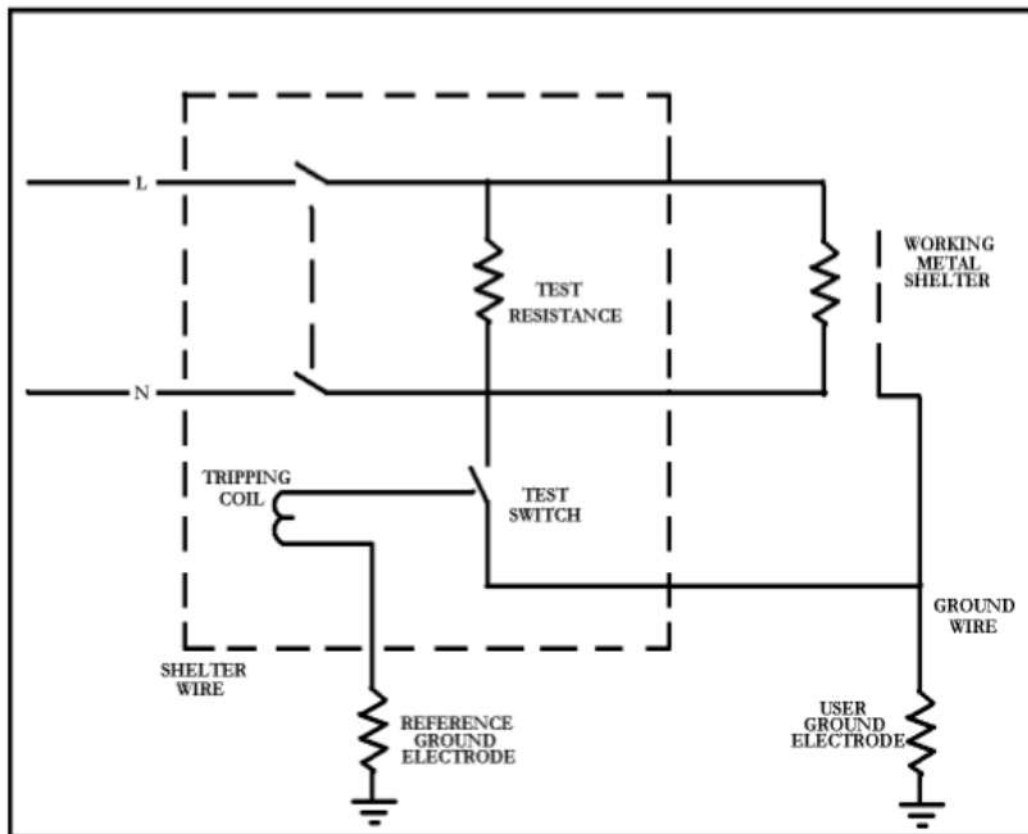


Figure 2.1 Residual Current Circuit Breaker voltage operate

## 2.2 Current Operated

The circuit breaker current type is shown in Figure 2.2. Refer to that figure, it has connection between earth wire and residual current circuit breaker. A transformer core is used to detect earth leakage current. In condition S1 and S2 are closed. The current which flows in live wire is same magnitude with current back to wire neutral (N) but different direction. The field in main core will cancel with other. That will make no voltage in secondary coil.

When earth leakage happens, current damage will flow to earth coil and not flow to neutral coil. This can be difference current magnitude at main coil and disturbed stabilization magnetic for main coil. Magnetic flux will in core and voltage happens in secondary coil. This makes tripping coil operate. S1 and S2 will open, and the power system will stop.

This residual current circuit breaker type is to compare current in phase conductor with current in neutral conductor. Any different current to earth may be cause of damage in system electricity. Residual current circuit breaker current type is shown in Figure 2.2 and Photo 2.1 and 2.2 show type of residual current circuit breaker type used as commercial.

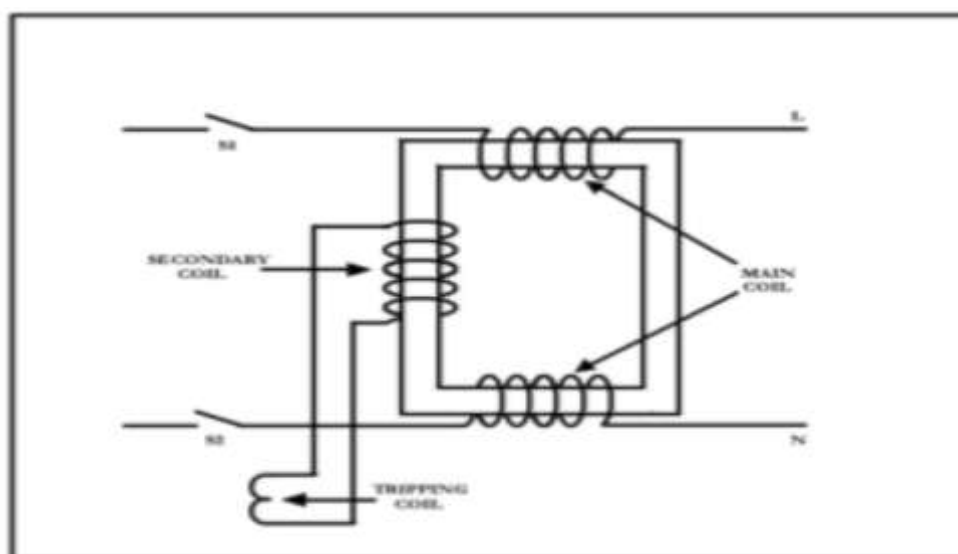


Figure 2.2 Residual Current Circuit Breaker (RCCB) current operate



Figure 2.3: Residual Current Circuit Breaker type ABB



Figure 2.4: Residual Current Circuit Breaker type NBSe

### **2.3 Electrical Fault**

A fault is any abnormal situation in a electrical system in which the elctrical current may or not flow through the intended part.Equipment failure also attributable to some defect in the circuit ,example is loose connection,insulation failure or short circuit etc.The type fault is

1. Over current Fault
2. Short circuit fault
3. Lightning fault

#### **Over Current Fault**

The National Electrical Code defines over current as any current in excess of the rated current of equipment or the amp city of a conductor. It may result from overload, short circuit, or ground fault. Current flow in a conductor always generates heat. The greater the current flow, the hotter the conductor. Excess heat is damaging to electrical components. For that reason, conductors have a rated continuous current carrying capacity or amp city. Overcurrent protection devices are used to protect conductors from excessive current flow. These protective devices are designed to keep the flow of current in a circuit at a safe level to prevent the circuit conductors from overheating. In term of over-current fault when a current greater than that which a circuit or a fuse is designed to carry, the fuse or wire may melt or damage the other elements of the circuit.