

**REAL-TIME SMS ALERT SYSTEM FOR CENTRALIZE MAIL
COMPARTMENT**

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**This report is submitted in partial fulfillment of the requirements for the award
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Honours**

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA
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Dedicated to my mother, my late father, my siblings and also my colleagues and friends who had been supporting me through thick and thin.

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ABSTRACT

This project is performed to realize the Real-time SMS Alert System for Centralize Mail Compartment applications. Mail compartment, or commonly known as pigeon hole, like the function of mailbox is used to receive and store physical mails sent by other people. The main objective of this project is to notify the mailboxes users whenever the mailbox receives mails. The alert or alarm system for this project will implement the use of Zelio Logic Smart Relay, a new innovation of Programmable Logic Controller. Together with a two-way communication system between users and the alarm system, the project will allow the users to remotely check the status of their mailbox content, whether it contains any mail or not. Global System for Mobile Communication technology will be used in this application to ensure the two-way communication can be achieved. The applications of this project will help to overcome problems of conventional method of manually checking the mailbox for mails.

ABSTRAK

Projek ini dilaksanakan untuk merealisasikan aplikasi *Real-time SMS Alert System for Centralize Mail Compartment*. Peti gerabak surat, atau lebih biasa dikenali sebagai lubang merpati, berfungsi seperti peti surat lain iaitu digunakan untuk menerima dan menyimpan surat yang dihantar oleh pengirim surat. Tujuan utama projek ini adalah untuk memaklumkan pengguna setiap kali mereka menerima surat di dalam peti surat mereka. Sistem peringatan atau penggera untuk pelaksanaan projek ini menggunakan *Zelio Logic Smart Relay*, sebuah inovasi baru dalam *Programmable Logic Controller*. Dengan sistem komunikasi dua arah antara pengguna dan sistem kawalan penggera, projek ini akan membolehkan pengguna untuk menyemak status isi peti surat mereka sama ada mengandungi surat atau tidak dari jarak jauh. Teknologi *Global System for Mobile Communication* akan digunakan dalam aplikasi ini untuk memastikan komunikasi dua hala dapat dicapai. Aplikasi dari projek ini akan membantu mengatasi masalah untuk menyemak isi peti surat secara manual.

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LIST OF ABBREVIATIONS

SMS	-	Short Message Service
IR	-	Infra-Red
PLC	-	Programmable Logic Controller
GSM	-	Global Service for Mobile Communication
PSM	-	Projek Sarjana Muda
I/O	-	Input & Output
CPU	-	Central Processing Unit
ZLSR	-	Zelio Logic Smart Relay
LCD	-	Liquid Crystal Display
DC	-	Direct Current
PC	-	Personal Computer
AC	-	Alternating Current
USD	-	US Dollar
MYR	-	Malaysian Ringgit
TDMA	-	Time Division Multiple Access
SIM	-	Subscriber Identity Module
USB	-	Universal Serial Bus
PDA	-	Personal Digital Assistant
AT	-	Attention
PDU	-	Protocol Data Unit
LED	-	Light Emitting Diode
PCB	-	Printed Circuit Board
IC	-	Integrated Circuit
UV	-	Ultra-Violet
PVC	-	Polyvinyl Chloride

CHAPTER 1

INTRODUCTION

1.1 Project Overview

Centralize mail compartment or pigeon hole are commonly seen in an office building or an apartment building. Conventional mailbox or mail compartment maybe becoming less popular nowadays where in this age of communication technology, electronic mails are more popular than physical mail. But, conventional mailboxes are still practical to be used especially for receiving important mails, for examples mails from government, private and confidential mails, bills and etc.

This project is proposed to overcome the problems rise due to the use of conventional mail compartment. The project aims to notify the users every time a letter is being sent into the mailbox, and to enable the users to check the status of their mailbox remotely.

The mail compartment alert system will operate via short messaging service (SMS) notification. Two infra-red (IR) sensors, one for transmitter and the other for receiver will be installed in mailboxes. Once a mail is inserted into the mailbox and cuts the IR signal, the circuit will automatically send a signal to the programmable logic controller (PLC) control systems. Then the PLC will send the preprogrammed message to the user's hand phone through the global system for mobile communication (GSM) modem.

The system can operate automatically without the need of human inspection. When the project completed, users do not have to repeatedly go to their mailbox to check whether a mail is delivered or not. The users also will never worry of forgetting to pick up their mails as there will be instant notification about the delivered mails.

1.2 Project Objectives

Projek Sarjana Muda's (PSM) aims is to provide opportunity for students to apply their skills and knowledge that they had learned in electric and electronics theories to produce a product that can be commercialized in market. This exercise can be an early exposure to real industrial work environment. Apart from that, students can gain precious experience from the process through various problem-solving skills. Students are also able to practice their presentation skills and techniques to promote their proposed products at PSM seminar's day. This project is developed to accomplish certain objectives such as below:

1. to design a conventional mail compartment alert system via short message service.
2. to overcome existing problems of forgetting to pick up mails or inconvenient of necessity to check the mailbox frequently.
3. to enable a new method of checking mailbox contents status by using hand phone and short message service.
4. to produce a product that can benefit the users, effective in applications and safe to be applied.
5. to increase knowledge and improve technical skills in electronics applications.

1.3 Problem Statement

For ages, some problem has risen due to the use of mail compartment. Even though it is not a big problem, but there are many users that wish they can use their mailbox with more ease. Conventional mailbox cannot notify users when a mail is received. Conventional mailbox does not have a system that can remotely notify or alert users every time they received a mail.

There are some users that forget to pick up mails, or maybe just do not have time to do so. They might miss important mails that need immediate reply and that would lead to some bigger problems.

Conventional mailboxes are inconvenient to use. For example, when people are expecting an important mail, they tend to frequently check their mailbox for new content. This is not really an effective way. Plus, it is a waste of energy and time.

1.4 Scope of Work

A few scopes and guidelines are stated to ensure the project is conducted within its intended boundary and to avoid exaggeration and unachievable attempts.

This project will cover on the development of the alert system of mailbox, the construction of sensor circuit, and the programming of the control system that to be used as interface between the system and users.

The development of the alert system utilizes the programming of the control system, which in this case is PLC. The PLC will decide what information will be send to user. A two-way communication between users and PLC will be established. A GSM modem will be used for this purpose.

The hardware sensor circuit that is developed consist of sensors to detects a mail is present in the mailbox or not. This project will not cover on the construction of the interface module, the control system, and the GSM modem.

1.5 Project Methodology

The project methodology is described in simplified version by using flowcharts. Figure 1.1 shows the flowchart of overall design method, which start with determining the objectives of the project. After that, research on information such as control system, interface module, materials and devices was carried out. After sufficient information obtained, the design of circuit and hardware can be carried out. The programming for control system is created after the installation of hardware system is done.

Figure 1.2 shows the circuit design implementation flowchart, which is the third step of the flowchart in Figure 1.1. This flowchart will focus on how the circuit hardware of the project is being developed. Firstly, circuits for the hardware are being searched and then its compatibility with the project is analyzed. Then the suitable components and devices are chosen based on the circuit. The circuit will be design in software simulations before the circuit can be developed. After the circuit was developed, it will be tested for functionality before it can be installed into the model.

Meanwhile Figure 1.3 shows flowchart of overall project functions for sending notification message to users. It starts when the sensor circuit and other devices connected to the supply. The PLC will check connection between first pair of IR sensor. If the connection is blocked by obstacle, PLC will then check connection between second pair of IR sensor. If the connection of second sensor is blocked, PLC will send notification message to user through GSM modem.

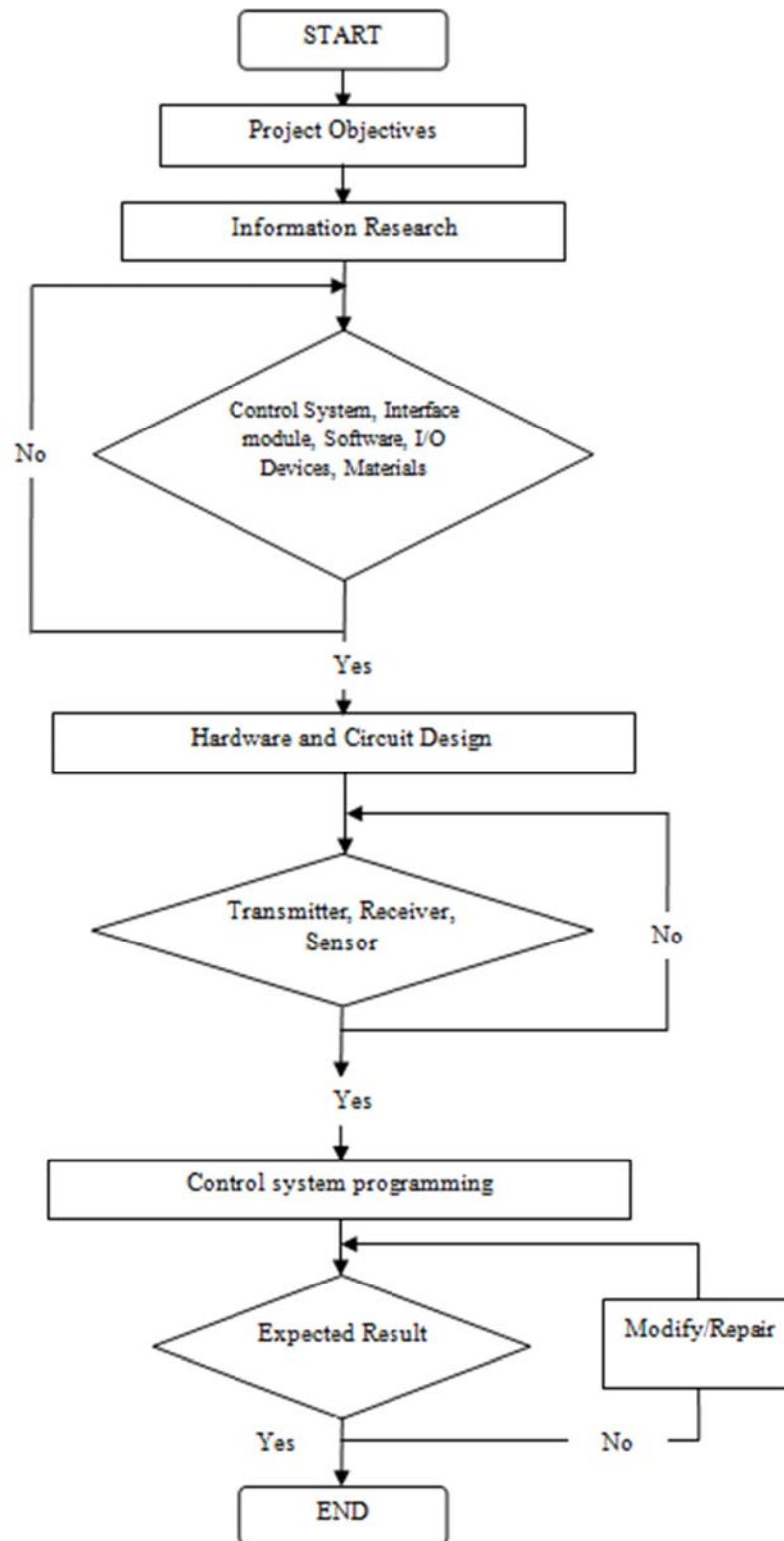


Figure 1.1: Flowchart of overall design method

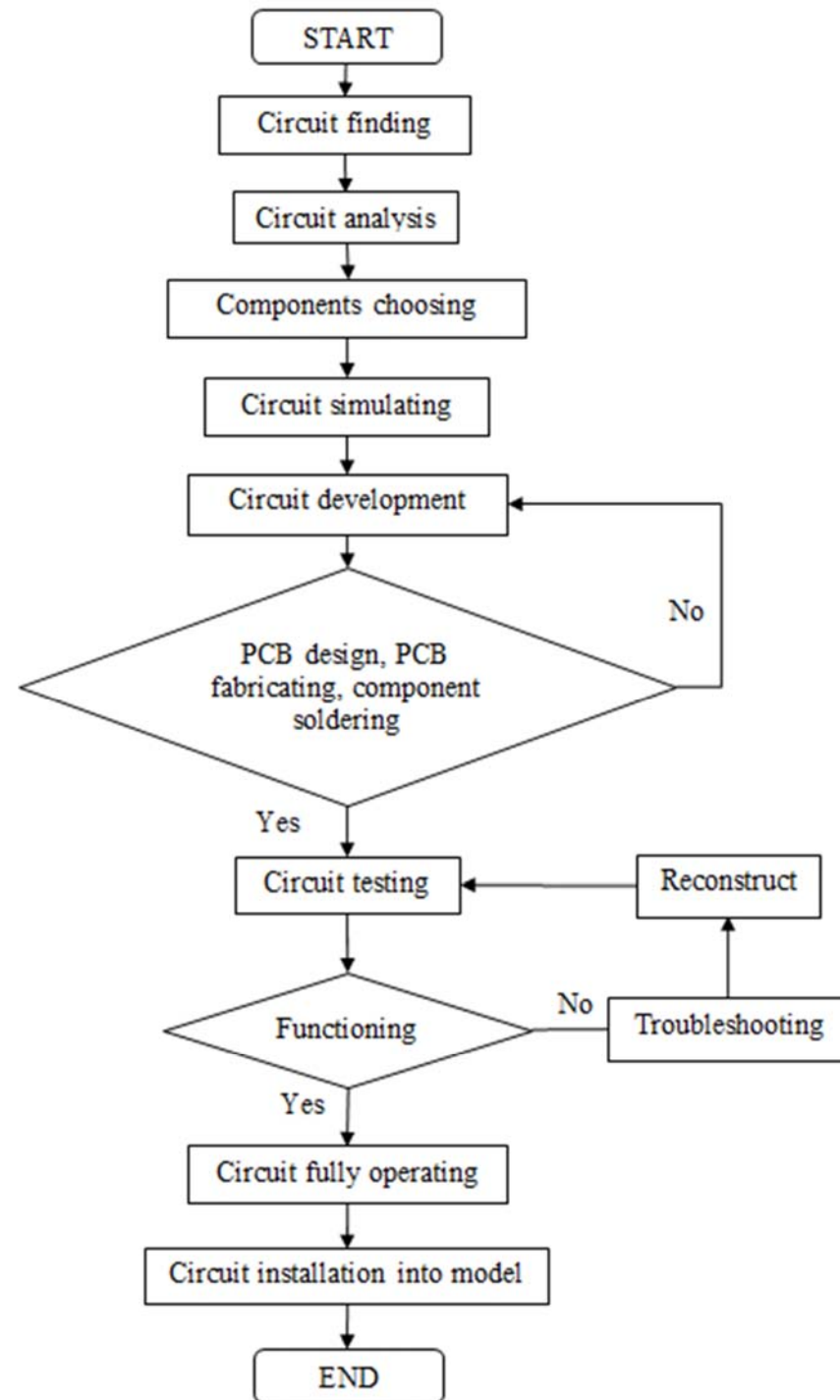


Figure 1.2: Flowchart of circuit design implementation

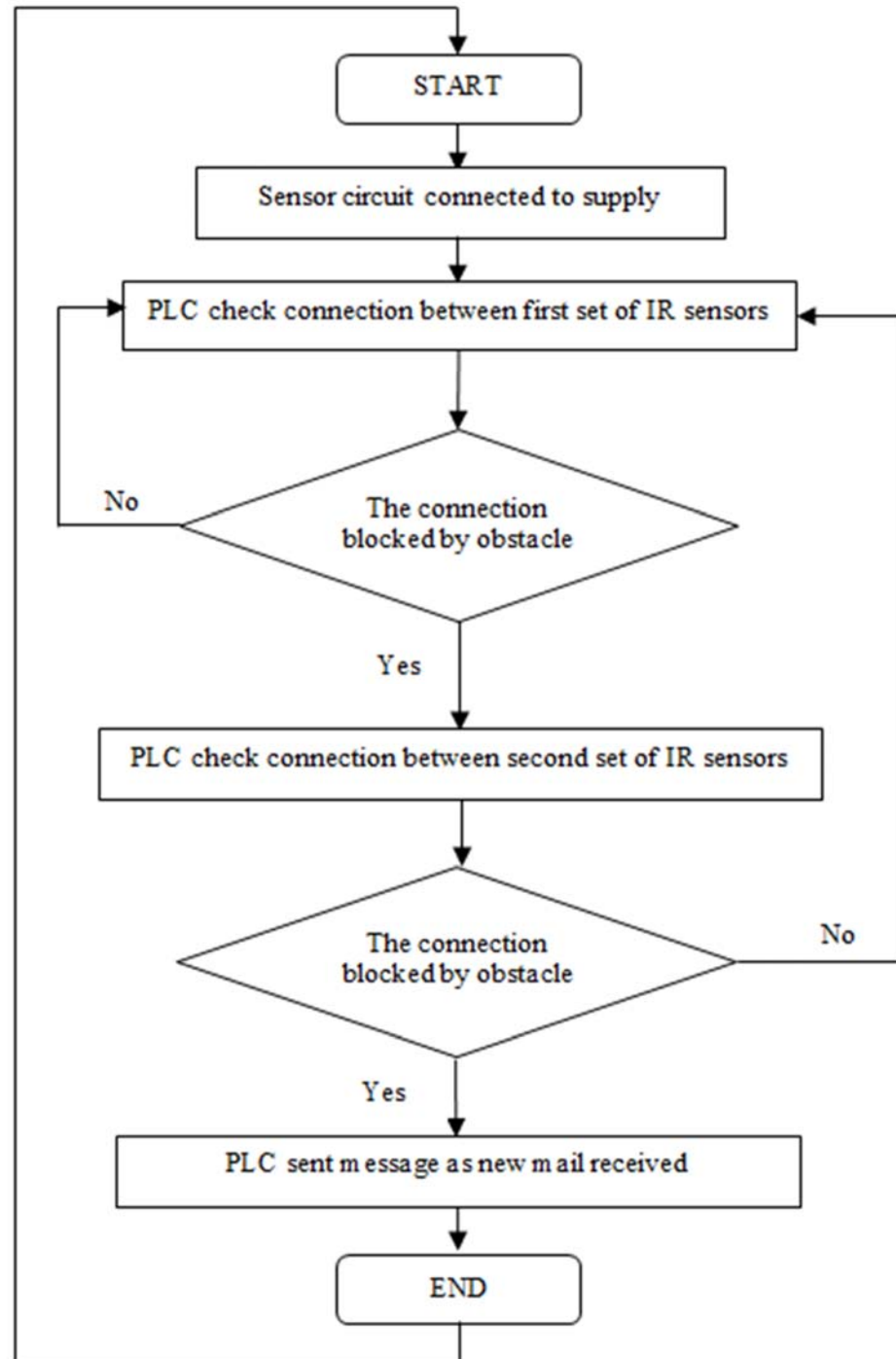


Figure 1.3: Flowchart of overall project function

1.6 Thesis Outline

The report thesis of this project is divided into five main chapters, starting with Chapter 1 which will present a brief introduction of the project, the project objectives and scope, and expected results of project.

In chapter 2, a review of the research of specific information and knowledge that are required to carry out the project such as hardware and software needed is wrapped up in literature review.

In chapter 3, the methodology and approach used in this project is described according to a few phases such as information research, hardware and software implementation and testing and troubleshooting.

Chapter 4 will presents about the result of the project and discussion on the obtained result. And on the final chapter will conclude and summarize the whole project, along with suggestion for possible future work.

CHAPTER 2

LITERATURE REVIEW

2.1 Overview

Before the project implementation can be carried out, literature review was conducted to gain information, knowledge and ability to finish the project. The sources of literature review came from various types of reading materials, such as books, journals, articles, technical reports and datasheets. The theories and other knowledge are important as a guidelines and references to achieve the objectives of this project.

2.2 Programmable Logic Controller (PLC)

A PLC is a specialized computer, a main controller and a brain of system designed to be used for industrial control to replace hardwired logic [1]. Generally, a PLC is preprogrammed with an operating system and with programs optimized for industrial control application [2]. The use of PLC is chosen for this project as it provides alternatives solution to hard wired logic control system for different types of programming and applications. In other word, PLC offers an easy way to reprogram the wiring rather than actually rewiring the control system. Table 2.1 shows the comparison between PLC and hard wired logic.