



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

MAILBOX NOTIFICATION VIA SMS USING GSM

This report submitted in accordance with requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Telecommunications) with Honour

by

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TAJUK: **MAILBOX NOTIFICATION VIA SMS USING GSM**

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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 Electronic Engineering Technology (Telecommunications) with Honour. The member of the supervisory is as follow:

.....

(Project Supervisor)

ABSTRACT

Mailing system is the system that still available and important to us. The mail will sent to our house and put in the mailbox by the postman. Mailbox is a box which a mail will deliver and place at front of house or entrance. Mailbox is important to protect the mail from damaged and avoid missing. The purpose of this project is to develop Mailbox Notification via SMS using GSM technologies and to replace the old trend of mailbox with adding of electronic technology by using GSM module. The GSM module is requiring the SIM card and operates over a subscription to a mobile phone. This project is proposed because of problem faced by the user when they did not realize when receive a new mail. The main component will use in this project is GSM module, Arduino Uno (ATmega328 microcontroller) and IR sensor. SMS will receive by the user with give them notification when receive a mail. This system will integrate with ATmega328 microcontroller while GSM module will integrate using AT command. This system will start operate when the IR sensor detect the mail send sent signal to microcontroller and then GSM module get the instruction to operate. As a result, user will receive the notification via SMS through their mobile phone. The benefit of this project is giving alert to user when have new mail and can avoid the lost important letter.

ABSTRAK

Sistem persuratan ialah sistem yang masih digunakan dan penting kepada kita. Surat akan di hantar ke rumah kita dan diletakkan di dalam peti surat oleh posmen. Peti surat ialah kotak di mana surat akan dihantar dan di tempatkan di hadapan rumah atau pintu masuk. Peti surat ialah penting untuk melindungi surat dari rosak dan mengelakkan dari hilang. Tujuan projek ini ialah untuk membangunkan peti surat pemberitahuan melalui SMS menggunakan teknologi GSM dan untuk menggantikan *trend* lama peti surat dengan menambah teknologi elektronik dengan menggunakan modul GSM. Modul GSM memerlukan SIM kad dan beroperasi melebihi langganan untuk telefon bimbit. Projek ini di cadangkan kerana masalah yang dihadapi oleh pengguna bila mereka tidak sedar apabila menerima surat yang baru. Komponen utama yang akan digunakan dalam projek ini ialah Modul GSM, Arduino Uno (ATmega328 mikropengawal) dan *IR sensor*. SMS akan diterima oleh pengguna dengan memberi mereka pemberitahuan apabila surat di terima. Sistem ini akan mengintegrasikan dengan ATmega328 mikropengawal manakala Modul GSM akan mengintegrasikan dengan arahan AT. Sistem ini akan mula beroperasi apabila *IR sensor* mengesan surat dan mikropengawal akan menghantar arahan kepada Modul GSM. Hasilnya, pengguna akan menerima pemberitahuan melalui SMS melalui telefon bimbit mereka. Manfaat daripada project ini ialah untuk pemberitahuan kepada pengguna apabila mempunyai surat baru dan boleh mengelakkan daripada kehilangan surat.

DEDICATION

Special dedication to
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LIST OF SYMBOLS AND ABBREVIATIONS

| | | |
|--------|---|---|
| ADC | = | Analog-to-Digital Converter |
| AUC | = | Authentication Unit Center |
| BSS | = | Base Station Subsystem |
| BTS | = | Base Transceiver Station |
| CDMA | = | Code Division Multiple Access |
| CPU | = | Central Processor Unit |
| DAC | = | Digital to Analog Converter |
| DTMF | = | Dual Tone Multi Frequency |
| ER | = | Equipment Identify Register |
| EEPROM | = | Electrical Erasable Programmable Read Only Memory |
| LED | = | Light Emitting Diode |
| LCD | = | Liquid Crystal Display |
| HLR | = | Home Location Register |
| GSM | = | Global System for Mobile Communication |
| GPRS | = | General Packet Radio Service |
| ISDN | = | Integrated Services Digital Network |
| IC | = | Integrated Circuit |
| IDE | = | Integrated Development Environment |
| IR | = | Infrared |

| | | |
|-------|---|---|
| MS | = | Mobile Station |
| MSC | = | Mobile Switching Center |
| MSS | = | Multimedia Messaging Service |
| MCU | = | Microcontroller Unit |
| NNS | = | Network and Switching Subsystem |
| OMSS | = | Operation and Maintenance Support Subsystem |
| OMC | = | Operational and Maintenance Center |
| PIC | = | Peripheral Interface Controller |
| PWM | = | Pulse-Width Modulation |
| PIN | = | Personal Identification Code |
| PUK | = | Personal Unlock Code |
| PSTN | = | Public Switched Telephone Network |
| SPI | = | Synchronous Serial Communication Interface |
| SMS | = | Short Message Service |
| SIM | = | Subscriber Identity Module |
| TTL | = | Transistor-Transistor Logic |
| RX | = | Data Receive |
| UART | = | Universal Asynchronous Receiver Transmitter |
| USART | = | Asynchronous Serial Communication Interface |
| USB | = | Universal Serial Bus |
| TDMA | = | Time Division Multiple Access |
| FDMA | = | Frequency Division Multiple Access |
| VLR | = | Visitor Location Register |

CHAPTER 1

INTRODUCTION

1.0 Introduction

This chapter will simply introduce about the project. Where, it state about the Background of project, Objectives, Problem statement, Scope of project, Work scope, and Report organization.

1.1 Background Project

Nowadays, the communication through letter became less important in people life as routine communication. This is happen because most of people prefer to use technology and social media to communicate each other such as using E-mail, Facebook and WhatsApp. The communication technology became more important in our life because the communication technology is fastest than communication through letter. However, the communication through letter still available to use for sent the important letter or document to people. The letter will send by postman to people address and postman will put in mailbox.

Mailbox is a box which mail will delivered and placed at a private residence or entrance for the difference purpose. The mailbox will be placed at front of house or have a centralised mail delivery station consisting of individual mailboxes for an entire building such as apartment and office. The distance of mailbox a little far with house so, when the mail was received, person do not realize when the mail was

coming. This will increase the risk of the important mail will be lose. The Mailbox Notification will be created to solve the problem that faced by person. The Mailbox Notification is using the electronic technology to give notification to user. So that, the user will be alert to the letter exists.

The system will generate a notification in the form of SMS to notify user when the new mail enter in mailbox every time. IR sensor will be used to detect incoming mail and data will send to microcontroller and user will be notifying via SMS. The GSM will be use to allow the message sent to the user when every mail entered into mailbox. GSM is global System for mobile communication which accepts a SIM card and operates over a subscription to a mobile operator. The GSM module and IR sensor will control by Arduino Uno (ATmega328 microcontroller). Arduino Uno (ATmega328) will act as the brain of the system that control the input and as well the output of the system. The PIC will control all the minor devices such as LCD display and also LED. All the functions of minor devices will be program in ATmega328 microcontroller.

This project has one input and three outputs. The input is infrared sensor (IR sensor) and the output is LED, LCD display and SMS which is GSM module will allow SMS sent to user that will control by Arduino Uno (ATmega328 microcontroller) that acts as a brain of this system. In addition, the types of material of the paper will be tested to know the types of paper that IR sensor can be detect. The types of material will be tested is A4 sized paper letter, plastic envelope and paper envelope.

1.2 Problem Statement

There are several problems in daily live when person do not realize or get notified when they receive a new mail or letters in their mailbox. So, people should check their mailbox content speculatively and periodically everyday whether they receive a mail or not. Therefore, this will take time and time consuming to check periodically. Next, the problem mostly faced by occupant at apartments, condominium and office buildings whereas they have limited to check their mail

regularly due to centralized mailbox location. This will waste the user time to check their mailbox every time. The other problem is user always lost their important mail or documents and they do not know whether the mail already sent in their mailbox or not. Therefore, the Mailbox Notification can reduce the risk in loss of the important mail. In order to solve this problem, the Mailbox Notification via SMS using GSM is design.

1.3 Project Objectives

In order to make this project successful, the objectives have been declared. These objectives must be achieved in completing this project. Therefore the objectives have been listed below:

1. To study interface between the GSM module and Arduino Uno as main controller.
2. To develop smart notification in mailing system via SMS.
3. To apply the GSM module as a medium to send the notification to the user when receive the mail.

1.4 Scope of Project

The scope of this project is to design the effective Mailbox Notification via SMS using GSM. The GSM is used as a device to allow the message can be sent to user and SIM card should be use to operate the GSM module. This project will introduce how the message will be sent to user using AT command when the IR sensor detect the mail. The operation of IR sensor as an input and LED, LCD display and SMS which is GSM module will allow SMS sent to user as an output will be control by Arduino Uno (ATmega328).

The green LED will light up when the IR sensor detect the new mail coming in mailbox and red LED will light up when no mail in mailbox. When no mail in

mailbox, the LCD display will display “Empty Mailbox” and when the mailbox received a mail, the LCD display will display “New Coming Mail”. The Reset button will be used to reset the mailbox in empty condition.

In addition, the types of material will be tested to know what type of material the IR sensor can detect. The types of material will be test is A4 sized paper letter, plastic envelope and paper envelope.

1.5 Work Scope

In order to achieve the project’s objective important work scope of this project had been highlighted. In addition, work scope project are stated to make sure all the important part are done and avoid from unnecessary work. The work scope in this project is

- i. Design system controlled by using Arduino Uno (ATmega328) to connect IR sensor, GSM, LED and LCD display.
- ii. Write program to control the system using Arduino IDE.
- iii. Understand an UART communication.
- iv. Perform AT command to operate the GSM module.
- v. Interface GSM module and sensor via Arduino Uno (ATmega328)
- vi. Identify how the GSM module can sent message to user.
- vii. Design prototype for Mailbox Notification via SMS using GSM.

1.6 Report Organizations

In this part will explain all the process and the flow for completing this report and project. This report will be conducted in few chapters and each stated as below:

Chapter 1: Introduction

This chapter will simply introduce about the project. This chapter contains Background of project, Objectives, Problem statement, Scope of project, Work scope, and report organization.

Chapter 2: Literature Reviews

This chapter shows about the studies and research of related or previous project. In addition, the research for literature reviews of the project also state. Last but not least, the conclusion of this chapter will be included to complete this chapter.

Chapter 3: Methodology

This chapter shows about the project methodology. In this chapter divided into 5 parts which is project planning, data collection, design project overview, software implementation, and hardware implementation. Last but not least, the conclusion of this chapter will be included to complete this chapter.

Chapter 4: Result and Discussion

This chapter will discuss the result testing and all analysis on the result obtained in this project through testing process. In addition, the overall results are discussed. Last but not least, the conclusion of this chapter will be included to complete this chapter.

Chapter 5: Conclusion and Recommendation

This chapter will discuss about the summarization of the project and the major conclusion of the project. Lastly, some of suggestion and recommendation was state for future work.

1.7 Summary

At the end of this chapter, the background of project was state to become more understand about the project. The problem statement was also stated in this chapter to show the purpose of developing the project. Then, the objective of this project was state and should be achieved at the end of this project. The scope of this project was state to make sure the project follow the scope. Next, the work scope was state to show the work should be due to complete this project. Lastly, the report organization also included to show the flow of this report by divided for each chapter. In the next chapter, the literature reviews about the project are discussed and collecting information of facts or journal.