UNIVERSITI TEKNIKAL MALAYSIA MELAKA

INTELLIGENT LETTER BOX USING GSM AND ARDUINO WITH AUTOMATIC NOTIFICATION

This report is submitted in accordance with the requirement of Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Degree of Electronics Engineering Technology (Telecommunications) With Honours

by

NORASYIKEEN BINTI SAHAT

B071310075

900313-01-5654

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

……

(Wan Haszerila Binti Wan Hassan)

ABSTRAK

Sistem pemberitahuan untuk surat yang diterima dalam peti surat yang sangat penting terutama bagi penduduk bangunan tinggi dan pejabat. Dengan menggunakan sistem ini, pengguna boleh melakukan semakan mel lebih cekap dengan bergantung kepada pemberitahuan daripada sistem. Objektif projek ini adalah untuk membangunkan satu sistem pemberitahuan mel pintar yang mampu untuk memberi amaran kepada pengguna apabila terdapat surat yang diterima dalam kotak surat itu melalui Perkhidmatan Pesanan Ringkas (SMS). Sistem yang direka terdiri daripada sensor infra-merah (IR), mikropengawal dan transceiver. Kami gunakan papan Arduino Uno sebagai pengawal mikro dan modul GSM sebagai penghantar-terima. Apabila sensor IR deria surat, ia akan mencetuskan pengawal mikro untuk menghantar arahan kepada modul GSM untuk menghantar mesej pemberitahuan ke nombor telefon yang telah ditetapkan. Kami menilai prestasi sistem yang direka dengan mengukur jarak surat di mana sensor IR yang dapat mengesan. Hasilnya menunjukkan bahawa sensor IR berkesan mengesan surat itu sehingga jarak 15 sentimeters yang bersamaan dengan ketinggian peti surat. Di samping itu, kami juga diuji mengesan dua saiz yang berbeza yang bersaiz A4 dan saiz sampul surat. Hasil kajian menunjukkan bahawa sistem ini dapat mengesan kedua-dua saiz.

ABSTRACT

A notification system for incoming letter in the letter box is very important especially for tall building residents and offices. By using this system, the user can do more efficient mail checking by relying on the notification from the system. The objective of this project is to develop an intelligent mail notification system that capable to alert the user whenever there are incoming letters in the letter box through Short Message Services (SMS). The designed system consists of an infra-red (IR) sensor, a microcontroller and a transceiver. We use an Arduino Uno board as the microcontroller and a GSM module as the transceiver. When the IR sensor senses a letter, it will trigger the microcontroller to send a command to GSM module for sending a notification message to the predetermined phone number. We evaluate the performance of the designed system by measuring the distance of the letter in which the IR sensor can detect. The result shows that the IR sensor effectively detects the letter up to the distance of 15 sentimeters which is equivalent to the letter box height. In addition, we also tested the detection of two different letter sizes which are A4 size and envelope size. The result shows that our system can detect both sizes of letter.

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DEDICATION

Special dedication to my loving family, all my siblings, and my kind hearted supervisor Mrs Wan Haszerila Binti Wan Hassan and also dearest friends

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LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

LCD	- Liquid Crystal Display
GSM	- Global System for Mobile Communication
SMS	- Short Message Service
IR	- Infrared Sensor
Rx	- Receiver
Tx	- Transmitter
PIR	- Passive Infrared Sensor
RFID	- Radio Frequency Identification

CHAPTER 1
INTRODUCTION

1.1 Introduction

For this chapter, it will explain with brief idea about the introduction of this project. It was more focus to the overview of project, objectives on detailing, problem statement, scope overall of this project. This project is about the Intelligence letter box using GSM and Arduino with automatic notification. PIR sensor will detect the movement of object. Once the sensor detect, the GSM will send the message to the specified number of user.

1.2 Project Background

In the times of innovation postman still goes to our home for conveying the letters, messengers and packages. Since a few things like dispatch, packages cannot sends by email or another electronic media. To get notice of the letter conveyance in our post box there is outline an astute letter box, where it gives notice of conveyance of letters in letter box by means of message to the cell telephones.

For this system project, the PIR sensor was detect the new incoming letter in the letter box. Then, the GSM module will send the notification to user smartphone. The LCD was appearing at the letter box that indicates the status of the letter box. Once the new incoming letter put inside the box, the GSM will get the command from the Arduino that information is the motion was detected. Then, the GSM will send the notification to the number telephone of user.

1.3 Problem Statements

Now day, the entire world is controlled by automatic. All people must have the technology in their life. Technology is becoming the important things to make the people easier in do everything. People, not have enough time to make the thing that have manually. With his system project, people not need to check every long day their letter to know there is had letter or not. It was wasting the time and also will be waste the effort. If they live at the high building, it was be problem to them, because the letter box place at the ground area. It was very difficult to check their letter every times if the letter is important. So that, this project is very useful for the all people and that suitable to place at the home or any office.

Intelligent letter box can be a simple and helpfully to others. This system operation is, when the new letter put inside the box, the notification can get by smartphone. These projects were design using by GSM and Arduino. That were will had software and also hardware.

1.4 Objectives

Based on below, there is the main objective for the project:

1. To study the function of Arduino and GSM
2. To design the letter box using Arduino and GSM
3. To understand the interfacing between hardware and software

1.5 Project Scope

This project is to design a method for automating the letter box which will give the notification once the letters were delivered to the letter box. This project application placed at the outside of the building such as home, office institutes and

etc. The user does not need to check the letter box every time the letters come in because they get the notification about letter delivery in the mail box. The intelligence letter box was provides delivery of notification letters through the SMS to smartphone.

The work scope for this project is design by using hardware and software. For the hardware part, there is consists of the operation of received and that will stored the information and will produce the output and information. That was control of this project. For the software part it consist software that used computer programming or essentially programming is any arrangement of machine-clear guidelines that guides particular operations.

While, the hardware part were consist the sensor circuit, Arduino, GSM module and LCD. The controlled circuit that used is the Arduino. The circuit sensor was connected to the Arduino to make a transmitter and receiver to the Arduino. Then the Arduino send to LCD display and send by wirelessly using GSM module send notification to the user by to the mobile phone.

CHAPTER 2
LITERATURE REVIEW

2.1 Introduction

For this chapter explains more about theory and the previous work related to the project field. It is a study or survey in comparison of certain hardware and software to ensure this system performs better than the existing letter box system.

2.2 Letter box

A letter box, letter plate, letter hole, deed, mail opening, or post box is a container for accepting approaching mail at a private home or business. For the inverse reason for examining active mail, a post box is for the most part utilized. Letterboxes or post boxes comprise of four essential outlines:

- An opening in a divider or entryway through which mail is conveyed (through-entryway conveyance)
- A container appended specifically to the house (way to-entryway conveyance)
- A container mounted at or close to the road (curbside conveyance)
- A brought together mail conveyance station comprising of individual letter drops for a whole building

- A brought together mail conveyance station comprising of individual letter drops for different beneficiaries at numerous locations in a specific neighborhood or group

Figure 2.1: Letter Box

2.3 Related Project

2.3.1 RFID and GSM Mailbox

Sebastianet.al (2015) has introduced the advancements in the Radio Frequency and GSM technologies and making use of those existing technologies we can design a device which is capable of identifying the arrival of courier and forward the same to the person who need to receive the mail and also send an acknowledgement to the courier office so that they do not require the signature of the particular person for whom the courier is meant for. The basic idea of the system is to employ an RFID tag to the courier and send the identity number to the receivers mobile. The receiver of the courier will have a letter box whose opening and closing is made automatically using Geared DC motor, which has an RF reader and a dedicated GSM modem in it. As soon as the courier boy drops the letter in to the letter box it the RF reader reads the identity number of the tag and informs

the same to the micro controller and compares it with the identity number send by the courier office and if both are same, then it sends message to the receiver and also to the courier office about the arrival of the courier.

To design the entire system we require a microcontroller which acts as a medium of communication between the RF reader and the GSM modem. The major advantage of this system is the presence of the GSM modem enables the device to communicate with the receiver no matter where ever he was present on the globe (GSM availability)

Figure 2.2: RFID and GSM Mailbox

2.3.2 The SMS or E-mail alert system for centralize mail compartment

Subramaniam et.al (2007) introduced MASYS is a device that alerts the users by sending notification on mail delivery which overwrites the conventional way of checking mails. This is an intelligent automated system which is capable to reacts base on the conditions of sensors placed in mailbox when mails are delivered. The sensor rapidly generates a signal to the real time programmable logic controller (PLC) and the text message is processed as preprogrammed in this unit. The user has an alternative to choose whether the notification is done via Sms or email. The processed text message will then be sent to the interface module which converts the message into transferable form to the GSM modem. Practically without the interface

module the PLC is unable to establish wireless communication. Once the message is transferred to the GSM modem, now the message will be transmitted to the address. The user is able to send an authorized code to the assigned number to check on the mailbox status at any time and the MASYS will generate an automated reply to the user according to the real time condition of the respective mailbox. This independent control unit operates as preprogrammed without human intervention at all times. The Zelio Logic Smart Relay (ZLSR) is the control unit being was used. ZLSR compromises the requirements of the MASYS in supporting with real time control system with the capability of preprogrammed wireless communication alerting system.

Figure 2.3: Pigeon Hole for SMS or E-mail alert system for centralize mail

2.3.3 GSM Based Notification System For Electronic Pigeon Hole

Helmy, Ahmad Al-hafiz and Herdawatie (2010).introduce GSM-Based Notification System for Electronic Pigeon Hole." Networked Digital Technologies Communications in Computer and Information Science Volume 88, 2010, pp 619-630. This paper presents the design and development of Electronic pigeon hole integrated with GSM network to send a notification of any upcoming loaded. The electronic pigeon hole is able to send notification message via short message service (SMS) to the designated user if any new

letter is placed in it. The innovation of the electronic pigeon hole could give immediate response for any urgent request for busy people. The system was developed by integrating a detection circuit to acknowledge the existing of new post items with the GSM modem to transmit SMS to specific user. It is found that the developed system is able to provide immediate notifications to intended users for further action. This Hardware project include the microcontroller, modem GSM and Pigeon hole.

Figure 2.4: GSM Based Notification System for Electronic Pigeon Hole

2.4 Global System For Mobile Communication (GSM)

GSM is an electronic cellular network. At that time, the standard originated it offered in the right time the typical originated it offered higher capacity than the existing analog systems. In addition, it allowed for a far more optimal a far more optimal also allocation of the radio spectrum, which therefore permits a greater quantity of range of that allows for a more substantial range of therefore subscribers**.** GSM is currently a global standard for mobile service. GSM can be an international standard for mobile service now.

It provides high mobility. Subscribers may easily roam worldwide and access any GSM network. Subscribers can roam worldwide and access any GSM network easily. GSM offers lots of services including tone of voice marketing communications. GSM offers a genuine range of services including tone of voice