



UNIVERSITI TEKNIKAL MALAYSIA MELAKA

**DEVELOPMENT OF PIGEON HOLE BOX SYSTEM USING IoT
FOR UNIVERSITY APPLICATION**

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

by

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DECLARATION

I hereby, declared this report entitled “Development of Pigeon Hole Box System Using IoT for University Application” is the results of my own research except as cited in references.

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Date :

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 (Industrial Electronic) (Hons.). The member of the supervisory is as follow:

.....
(Mdm Siti Halma Binti Johari)

ABSTRAK

Pada masa kini, ‘pigeon hole’ merupakan salah satu medium yang penting untuk pensyarah dan juga pelajar yang ingin menghantar tugas atau dokumen. Dengan adanya kotak ‘pigeon hole’ ini, pelajar tidak perlu untuk mengganggu pensyarah hanya untuk menghantar tugas melainkan pelajar perlu berbincang dengan pensyarah jika terdapat sesuatu yang penting sahaja. Walaubagaimanapun, kadang-kadang pensyarah terlalu sibuk dan tiada masa untuk memeriksa ‘pigeon hole’ setiap hari atau setiap masa. Malah, sesetengah bilik pensyarah agak jauh dengan kotak ‘pigeon hole’ mereka. Jadi, teknologi moden masa kini mampu mengatasi masalah ini dengan menaik taraf sistem untuk memudahkan pensyarah memeriksa kotak ‘pigeon hole’ mereka. Projek ini akan membantu pensyarah untuk memastikan mereka mengetahui jika kotak ‘pigeon hole’ mereka terdapat tugas atau dokumen yang dihantar oleh pelajar dengan memaparkan melalui Aplikasi Blynk di telefon pintar pensyarah. Blynk adalah platform dengan aplikasi iOS dan Android untuk mengawal Arduino melalui internet. Sistem ini menggunakan Arduino Mega, IR Sensor dan Wi-Fi Module. Sistem ini akan memaparkan jumlah tugas atau dokumen yang dihantar oleh pelajar melalui Aplikasi Blynk di telefon pintar pensyarah pada setiap jam lima petang. Sistem ini lebih mudah dan menjimatkan masa kerana pensyarah akan hanya diberitahu melalui paparan aplikasi Blynk sama ada kotak ‘pigeon hole’ mereka terdapat tugas atau dokumen pada jam lima petang.

ABSTRACT

Nowadays, the pigeon hole is one of the important medium for lecturer and students who need to send the assignment or document. With this pigeon hole box, students do not have to interfere with lecturer for only to submit the assignments unless students need to consult with the lecturer if there is something important to discuss. However, sometimes the lecturers are too busy and doesn't have much time to check the pigeon hole every day or time. In fact, some lecturer's room are quite far from their pigeon hole box. So, modern technology is now able to overcome this problem by upgrading the system to facilitate lecturer's checking their 'pigeon hole' box. This project will help the lecturer to make sure they know if their 'pigeon hole' boxes contains any assignment or document sent by students by displaying Blynk apps on lecturer's smartphone. Blynk is a platform with iOS and Android apps to control Arduino over the internet. This system uses Arduino Mega, IR Sensor and Wi-Fi Module. This system will display the number of assignments or documents sent by the student through the apps on the lecturer's smartphone at 5 pm. The system is more convenience and saves time as lecturers will only be notified via Blynk apps display whether their pigeon hole box have any assignments or document at 5 pm.

DEDICATION

Special dedicated to my beloved parents, my father Esmom Bin Sarpi and my mother Chee Bee Binti Ahmad, my husband Edzwan Bin Ismail, family members and friends.

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TABLE OF CONTENT

Declaration	i
Approval	ii
Abstrak	iii
Abstract	iv
Dedication	v
Acknowledgement	vi
Table of Content	vii
List of Table	x
List of Figure	xi
List Abbreviations, Symbols and Nomenclatures	xiii
CHAPTER 1: INTRODUCTION	1
1.0 Introduction	1
1.1 Background	1
1.2 Problem Statement	2
1.3 Objective	3
1.4 Work Scope	3
1.5 Conclusion	4
1.6 Structure of Project	5
CHAPTER 2: LITERATURE REVIEW	6
2.0 Introduction	6
2.1 Previous Project Research	7
2.1.1 Real time mailbox alert system via sms or email	7
2.1.2 An Internet of Things based Intelligent Transportation System	8
2.1.3 Internet of Things (IoT) Enabled Water Monitoring System	8
2.1.4 Integration in the Physical World in Iot Using Android Mobile Application	9
2.1.5 An IoT based Home Automation Using Android Application	10
	vii

2.1.6	An Intelligent Monitor System for Home Appliances Using IoT	11
2.1.7	Internet of Thing Based HealthCare Monitoring System	12
2.1.8	Internet of Things based Vehicle Monitoring system	12
2.1.9	Internet of Things (IoT) for building Smart Home System	13
2.1.10	IoT based Smart Water Tank with Android application	14
2.2	Hardware Overview of the System	15
2.2.1	ESP8266 Wi-Fi Module	15
2.2.2	Smart Phone	16
2.2.3	Arduino Mega	17
2.2.4	DS1302 Real time Clock Module	20
2.2.5	IR Sensor	21
2.2.6	Comparison Wireless Technologies	22
2.3	Software Overview of the System	25
2.3.1	Arduino Software IDE	25
2.3.2	Blynk Application	27
2.4	Conclusion	28
CHAPTER 3: METHODOLOGY		29
3.0	Introduction	29
3.1	Project Methodology	29
3.2	Flow of project	30
3.3	Project Block Diagram	32
3.4	Flowchart of Project Function	33
3.5	Flowchart of Project Development	34
3.6	Software Implementation	35
3.6.1	Blynk Application	35
3.6.2	Arduino Coding	36
3.7	Hardware Implementation	42
3.8	Conclusion	44

CHAPTER 4: RESULT AND DISCUSSION	45
4.0 Introduction	45
4.1 Survey Analysis	45
4.2 Project Analysis	51
4.2 Conclusion	53
CHAPTER 5: CONCLUSION AND RECOMMENDATION	54
5.0 Introduction	54
5.1 Conclusion	54
5.2 Future Recommendation	55
5.3 Summary of Chapter	55
REFERENCES	56
APPENDICES	58

LIST OF TABLES

2.1	Technical Specs of Arduino Mega	18
2.2	Comparison between Arduino Mega and Arduino Uno	19
2.3	Wireless Connectivity Techniques	24
4.1	Pigeon Hole Utilization	46
4.2	Assignments Submission Places	47
4.3	Pigeon hole Checking Time	48
4.4	Reasons for not using a pigeon hole	49
4.5	Overall data evaluation	52

LIST OF FIGURES

2.1	The real time MASYS block diagram	7
2.2	IoT system components of Internet of Things (IoT) Enabled Water Monitoring System	9
2.3	Results of Home Automation Using Android	10
2.4	Block Diagram of an Intelligent Monitor System for Home Appliances Using IoT	11
2.5	Proposed systems for vehicle tracking/monitoring	13
2.6	FLIP Architecture of Internet of Things (IoT) for building Smart Home System	14
2.7	ESP8266 Wi-Fi Module	15
2.8	Smart Phone	16
2.9	Arduino Mega	17
2.10	Arduino Mega VS Arduino Uno	18
2.11	DS1302 Real time Clock Module	20
2.12	IR Sensor	21
2.13	Wi-Fi Technologies	22
2.14	Bluetooth Technology	23
2.15	ZigBee Board	24
2.16	Arduino Software IDE	26
2.17	IoT on Blynk Apps	27
3.1	Flowchart of Final Year Project	31
3.2	Block Diagram of Pigeon Hole Box System Project	32
3.3	Flowchart of Pigeon Hole Box System Project Function	33
3.4	Flowchart of Project Development of Pigeon Hole Box System	34
3.5	Blynk Smartphone Screen Control	36
3.6	Libraries Coding	36
3.7	Project Settings	37
3.8	Auth Token and Wi-Fi Credential	37
3.9	Assign Digital Pins	38

3.10	Count and Reset Systems	38
3.11	Interrupt Numbering and RTC Time Setting	39
3.12	Duration Time Settings	40
3.13	Notifying at 5 pm	40
3.14	Conversion of Double to String	41
3.15	Implementation of the Circuit	42
3.16	Front View Prototype of Pigeon Hole Box	43
3.17	Side View Prototype of Pigeon Hole Box	43
3.18	View inside the Pigeon Hole Box	44
4.1	Pigeon Hole Utilization	46
4.2	Assignments Submission Places	47
4.3	Pigeon hole Checking Time	49
4.4	Reasons for not using a pigeon hole	50
4.5	Assignments inside the physical pigeon hole box	51
4.6	Number of Assignments Display on LCD and Blynk apps	52
4.7	Notification Alert via Blynk Apps at 5pm	53

LIST OF ABBREVIATIONS, SYMBOLS AND NOMENCLATURE

IoT	-	Internet of Things
GSM	-	Global System for Mobile
SMS	-	Short Message System
LED	-	Light Emitting Diode
LCD	-	Liquid Crystal Display
IR	-	Infrared
IDE	-	Integrated Development Environment
WLAN	-	Wireless Local Area Network
PWM	-	Pulse-Width Modulation
USB	-	Universal Serial Bus
ICSP	-	In-Circuit Serial Programming
V	-	Voltage
MHz	-	Mega Hertz
KB	-	Kilo Bytes
PC	-	Personal Computer
PIC	-	Peripheral Interface Controller
HDMI	-	High-Definition Multimedia Interface

PDA	-	Personal Digital Assistant
PCB	-	Printed Circuit Board
DTMF	-	Dual Tone Multi Frequency
AM	-	Ante Meridiem
PM	-	Post Meridiem
A/D	-	Analog-to-Digital
USB	-	Universal Serial Bus
IEEE	-	Institute of Electrical and Electronics Engineer's
WPA	-	Wi-Fi Equivalent Privacy
SPI	-	Serial Peripheral Interface Bus
ICSP	-	In-Circuit Serial Programming
IP	-	Internet Protocol
TCP	-	Transfer Control Protocol
SSID	-	Service Set Identifier
SDA	-	Serial Data Line
RF	-	Radio Frequency
RTC	-	Real Time Clock
WPAN	-	Wireless Personal Area Network
URL	-	Uniform Resource Locater
TTL	-	Transistor-transistor logic

AREF pin	-	Above GND on Arduino port
IOREF	-	IO voltage reference (connected to +5V)
SCL	-	SAS Component Language
DFU	-	Device Firmware Upgrade
UDP	-	User Datagram Protocol
FTDI	-	Future Technology Devices International
SD	-	Secure Digital
WEP	-	Wired Equivalent Privacy
IIS	-	Internet Information Services

CHAPTER 1

INTRODUCTION

1.0 Introduction

In this chapter, the purpose of the project about the Development of Pigeon Hole Box System using IoT with for University Application by using Wi-Fi Module will be described generally. Start with a brief explanation about the background of the project. Then, the problem statement that lead to the idea for this project and objective that aimed to be achieved are established in order to overcome the problem statement. This chapter also explains the work scope that will be discussed in the project and the project significance.

1.1 Background

Nowadays, pigeon hole seem to be the most important medium for lecturer to check and collect the documents or assignments and students to submit their assignment in a certain university. The Development of Pigeon Hole Box System using IoT for University Application is design to overcome every lecturer's problem which does not have much time to check the pigeon hole if there any present of assignment or document. The method of checking assignment or document in pigeon hole has not updated yet until today where most lecturer still need to check the pigeon hole by them self in order to pick up the submitted assignment by the student.

For this project, the electronic technology was applied to overcome this problem. Pigeon Hole Box system is builds up by using Arduino Mega and Wi-Fi Module as wireless transmission. By using the infrared (IR) sensor, it will detect the

document or assignment that relayed or inserted into the pigeon hole box and after the sensor has triggered, it will automatically count the assignments inserted and send an information and alert signal via Blynk apps notification to the lecturer's smart phone.

The infrared sensor will count the number of assignments based on the amount of insertions made. Subsequently, it will display on the liquid crystal display (LCD) screen the amount of the documents at in front of the pigeon hole box. The proposed system consists of two parts, namely the transmitting unit and receiving unit. The Transmitting unit involves a sensor and Arduino that will transmit the signal to the Wi-Fi Module when the sensor is triggered. This project will also make easy human life by notify using Blynk Apps to alert the user about the document receive and save lecturer time in checking their pigeon hole every day.

1.2 Problem Statement

There are the several problems that has been identify in this project. This problem statement will be the core statements in replacing the existing pigeon hole mailbox system which are:

(i) Checking system.

Every day, lecturer's needs to check manually by them self at their pigeonhole, either they got assignment or document or not. If the pigeon hole is far from the lecturer room or place than it is difficult to them to check regularly to collect the assignment or document.

(ii) Time Consuming.

If the lecturer's pigeon hole is far from their place, then it might take a little time to collect the submitted assignment or document. Sometimes lecturer's are busy and does not have much time to check whether their pigeon hole is containing any assignments or documents. If there are only a few assignments

in the pigeon hole, then it will only wasting lecturer's time to collect the assignments.

(iii) Inconvenience System

It is inconvenience when lecturer needs to check their pigeon hole regularly for at least three times a day. Besides, sometimes lecturer does not have much time until they forgot to check and collect the assignments inside the pigeon hole.

1.3 Objectives

The main purpose of the Pigeon Hole Box System is to improve the manual checking system to the digital way by sending notification about the assignment or document arrived to the user through a Blynk apps. There are several objectives that will be the goal that need to achieve:

- To study the collaboration of Arduino Microcontroller, and Blynk Application.
- To develop a pigeon hole box system for university application using Arduino Microcontroller, Wi-Fi Module and Blynk Application.
- To validate the performance of Pigeon Hole Box System.

1.4 Work Scope

1. The User (pigeon hole owner)

The checking process will be covered by the system that will be alert to the lecturer via Blynk Apps at 5 pm. When this system of pigeon hole box at Faculty of Engineering Technology is applied, then lecturer's does not have to check their pigeon hole regularly.

2. Document or assignment only.

This Pigeon Hole Box System is for the document or assignment in size of A4 paper only. It will not function for parcel detection.

3. Display apps to notify the user and alert using LCD display.

This system will display the number of assignments or documents sent by the student through the Blynk apps on the lecturer's smartphone at 5 pm. This system also will display on LCD indicator the current number and total number of the assignment in front of the pigeon hole box. Moreover, lecturer's still need to collect assignments or documents in their pigeon hole manually.

4. Insertion method.

This project required an insertion method which each assignment or document must be inserted one by one.

1.5 Conclusion

As a conclusion, at the end of this chapter, by having the Arduino microcontroller, IR sensor and Wi-Fi module, a smart notification system can be developed to notify lecturer if their pigeon hole have any assignment or document. Arduino microcontroller will be act as a brain system of pigeon hole box system. It will start operated once assignment or document has been detected by the IR sensor. When the time is already 5 pm, this system will display the number of assignments or documents sent by the student through the Blynk Apps on the lecturer's smart phone.

1.6 Structure of Project

This project consists of five chapters:

Chapter 1 consists of the overall overview about of the project. In this chapter, the problem statement will be stated. After that, the objective and scope will be defined by refer to the problem statement. The scope must be stated clearly in this chapter.

Chapter 2 consists of literature review about the existing system which is previous project research. The source of these researches has to be acceptable in the system format such as books, journals, articles and website that are licensed The enhancement of the existing system will be proposed. This chapter also will simply brief about the current system that will be developed.

Chapter 3 consists of research methodology that will be used in developing this project. This chapter will explain more about the device and equipment that will be used during developing process and consists of implementation and maintenance of the project. This chapter will explain about the steps of developing process and programming codes that have been used.

Chapter 4 is discussions about the result, the output from the project and the findings of the study which the result from the experiments that are presented in tables, figures, drawings and graphs.

Chapter 5 will summarizes the outcomes of this experiment. The chapter also outlines several recommendations for further development and improvement on the design. Suggestions for future inventor are also provided within the chapter.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

This chapter will cover the literature review of the previous study in order to improve the pigeon hole box system. In this chapter, it will discuss and summarize topic which it contains the information gathered to gain knowledge and ideas in completing the project.

The pigeon hole box system for university application is design with a several key point taken as a subject studied for this research. There are several sources that have been taken as a resource such as books, thesis, journal and website. It was included the operation of the circuit, the hardware and software which is useful in the project. The aspect involved in this literature review is:

1. Previous project research
2. Wi-Fi Module
3. Arduino Microcontroller
4. IR Sensor
5. Arduino Software IDE
6. Blynk Applications
7. Proteus 8 Software

2.1 Previous Project Research

2.1.1 Real time mailbox alert system via sms or email

The system is designed by sending a short messaging system or email to alert and notify the users about important new mails reaching their mailbox. The programmable logic controller, interface module and the GSM modem can be incorporated by using linking the user's mailbox with quick messaging system or email facilities and this enables the users to be notified whenever a new mail is delivered. When mails delivered into the user's mailbox, the system will automatically generate an alert by sending a short message system or email. Besides that, the user are capable of checking their mailbox status by sending a SMS to the system and control system will reply base on the latest status of the mailbox to the user. This project is very effective and conventional method because user can always be alert of important mails that received because of the high confidentiality and official letters are increasing as a corresponding tool globally. (Al Subramaniam *et al.*, 2007)

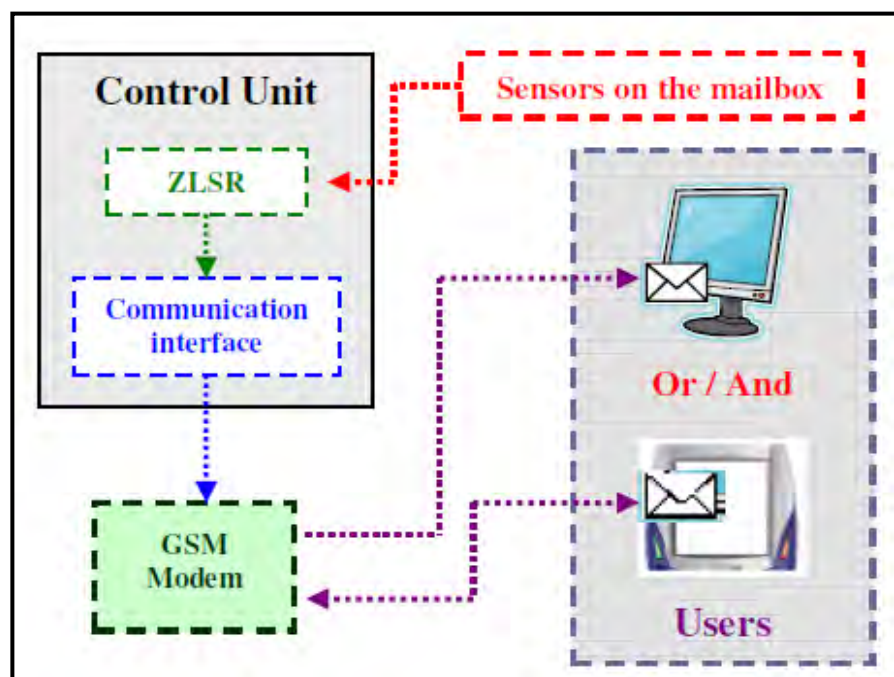


Figure 2.1 The real time MASYS block diagram