UNIVERSITI TEKNIKAL MALAYSIA MELAKA

INTELLIGENT PIGEON HOLE WITH E-MAIL NOTIFICATION USING WIRELESS SYSTEM

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

by

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TAJUK: **Intelligent Pigeon Hole with E-Mail Notification Using Wireless System**

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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 (Department of Electronics and Computer Engineering Technology) (Hons.). The member of the supervisory is as follow:

…….

(Abdul Halim Bin Dahalan)

ABSTRACT

Upon receiving of the letter or any document in their pigeon holes or mailbox, most users were not notified about this. They have to speculatively and periodically check their mailbox contents. In most occurrences, users have neglected to check their mailbox. At the same time, may lead towards the ignorance of important letters and results in various miseries. Most of the multi-storey buildings such as apartments, condominiums and office buildings are limited to check or collect their letters due to the centralize mailbox location. Users find convenient to be on alert of mails they receive to overwrite the conventional method of checking mailbox. Because of the high confidentiality and official letters are increasing as a corresponding tool globally, the users seek for a better solution which enables them to be on their toes each time a mail is delivered. The state of the art electronics technology is incorporated into these conventional mailboxes as a solution. The Arduino UNO and Infrared Sensor can be incorporated by linking the user's pigeon hole with E-mail facilities and this enable the users to be notified whenever a new mail is delivered and pigeon hole is full. Mails delivered into the users pigeon hole, the system will automatically generate an alert which is send in E-mail that typically details the real time of mail delivery. The system is design to easy human life by sending E-mail to notify the users about important new mails reaching their pigeon hole or mailbox.

ABSTRAK

Apabila menerima surat baru atau sebarang dokumen dalam *"pigeon holes"* atau peti surat mereka, kebanyakan pengguna tidak diberitahu mengenai hal ini. Mereka perlu bersangka dan secara berkala untuk memeriksa kandungan peti surat mereka. Dalam kebanyakan kejadian yang berlaku, pengguna telah lalai untuk memeriksa peti surat mereka. Pada masa yang sama, boleh membawa kepada kebuntuan tentang surat penting dan keputusan dalam pelbagai kekusutan. Kebanyakan bangunan yang bertingkat seperti pangsapuri, kondominium dan bangunan pejabat adalah terhad untuk memeriksa atau mengutip surat mereka disebabkan lokasi peti surat yang berada ditengah. Pengguna mendapati untuk amaran tentang surat yang mereka terima dengan menukar kaedah konvensional memeriksa peti surat. Ini kerana, surat rasmi dan kerahsiaannya yang tinggi sebagai alat sesuai untuk globalisasi, oleh demikian pengguna mencari penyelesaian lebih baik dimana mereka wujudkan amaran setiap kali surat yang dihantar. Oleh itu, kemahiran teknologi elektronik telah menggabungkan ke dalam peti surat konvensional sebagai penyelesaian. Arduino UNO dan pengesan inframerah yang boleh dimasukkan dengan menggabungkan *"pigeon holes"* pengguna dengan kemudahan E-mel and membolehkan pengguna diberitahu setiap kali surat dihantar dan *"pigeon holes"* telah penuh. Surat yang dihantar ke *"pigeon holes"* pengguna, akan menghasilkan sistem amaran yang automatik menghantar berbentuk E-mel yang kebiasaanya jelas tentang masa sebenar penghantaran surat. Sistem ini direka untuk memudahkan kehidupan manusia dengan menghantar E-mel untuk memberitahu pengguna tentang surat yang penting telah berada didalam *"pigeon holes"* atau peti surat mereka.

DEDICATIONS

Special dedication to

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LIST OF SYMBOLS AND ABBREVIATIONS

IR	=	Infra-Red
PSM	=	Projek Sarjana Muda
PCB	=	Printed Circuit Board
Wi-Fi	=	Wireless Fidelity
PDAs	=	Personal Data Assistant
Mbps	=	Megabits per Second
IEEE	=	Institute of Electrical and Electronic Engineer
BSS	=	Basic building block of a wireless
CSMA/CA	=	Carrier Sense Multiple Access/Collision Avoidance
Wi-Max	=	The IEEE 802.16 family of wireless network
LCD	=	Liquid Crystal Display
PWM	=	Pulse Width Modulation
USB	=	Universal Serial Bus
ICSP	=	In-Circuit Serial Programming
UART	=	Universal Asynchronous Receiver/Transmitter
PLC	=	Programmable Logic Control
DFU	=	Device Firmware Update
GPS	=	Global Positioning System

CHAPTER 1
INTRODUCTION

1.0 Introduction

This project is about the development of the Pigeon Hole Notification that used E-mail to notify recipient from pigeon hole to personal computer at their room. In this chapter, it will explain about the Background of project, Objectives, Problem Statement, Scope of Project, Work Scope, and Report Organization.

1.1 Background

Centralize mail compartment or pigeon hole are commonly seen in an office building or an apartment building. However, the communication by through letter it is not preferred to use anymore. For example, the wireless technology revolution is increasing rapidly in routine applications. It is regarded as one the solution to ease the communication either among people or between people and services. This is because, this technology also enables the information imparts and communication process done in short time interval anywhere and anytime. But, conventional mailboxes are still practical to be used especially for receiving important mails.

In general, each staff in most big organization has his/her own pigeon hole to receive any important letter or memo related to official duty. In the case of University Teknikal Malaysia, Melaka (UTeM), each academic staff has been allocated a pigeon hole for any letters or assignment from students from within or inter faculty. Unfortunately, the current conventional pigeon hole system is unable to inform the staff or any urgent letter and this lead to significant delay in responding

the letter. The main weakness of current system is that staff needs to check their respective pigeon hole everyday but due to the routine commitment or unforeseen circumstances the pigeon hole cannot be possibly checked every day.

This project is proposed to overcome the problems rise due to the use of current conventional mail compartment. The project aims to notify the user every time a letter is being sent into the pigeon hole, and to enable the users check status of their pigeon hole whether full or not. In this project, the system can generate automatically without the human inspection. The system will generate a notification through E-mail to notify user when the new document already in pigeon hole used wireless network technology. Two infra-red (IR) sensor, one for transmitter and the other one for receiver will be installed in pigeon hole. The system will operate once mail or any document insert into the pigeon hole and block the IR signal, the system automatically send form E-mail.

1.2 Problem Statement

The current conventional pigeon hole system is unable to notify the user. Even though it is not big matter, but in different situation is more complicated too. For example this problem is faced academic staff. The main weakness of current systems is that staff needs to check their respective pigeon hole every day. At the same time, staff lost their document, especially important thing, such assignment or lab report student. They do not know what happen actually, whether the document already submit in their pigeon hole or not.

In big organization or office buildings whereas their staff office rooms between pigeon hole is bit far. This because, normally pigeon hole or mailbox is installed at centralized at the buildings, so they tend to frequently check their mailbox for new content. This is not really an effective way to apply. Furthermore, it is waste of energy and time.

1.3 Project Objectives

Projek Sarjana Muda's (PSM) aims is to provide opportunity for students to apply their skill and knowledge that had learned in electric and electronics theories to produce a product that can be commercialized in market. Based on that, 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:

i. to study combination between of hardware and software to use for completing this project.
ii. to develop software that notify user via E-mail when document is detect and full.
iii. to solve problem for forgetting check the document on pigeon hole.

1.4 Scope of Project

In order to achieve the project's objective important scope project had been highlighted.

i. Design a prototype self-built model to represent the mail boxes which is a pigeon hole mail box.
ii. Simulate the design circuit and the performance using the relevant software (MATLAB / MULTISIM).
iii. Infrared (IR) sensor detection of the presence of new mail.
iv. Identify methods of the transmission signal to notify E-mail.

1.5 Work Scope

In order to achieve the project's objective important work scope of this project had been highlighted. The work scope of this project is divided into three (3) parts:

1.5.1 Hardware

i. Etching process.
ii. Construct circuit on PCB board
iii. Solder circuit.
iv. Design prototype of Pigeon Hole Notification.

1.5.2 Software

i. Design and simulation circuit using MULTISIM.
ii. Design schematic circuit using PROTEUS.
iii. Python.

1.5.3 Command

i. Protocol Wireless Network Connection
ii. Arduino Uno command program used to send signal from IR sensor circuit to notify E-Mail.

1.6 Report Organization

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 started 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 flow of project methodology to achieve the objectives. Last but not least, the conclusion of this chapter will be included to complete this chapter.

Chapter 4: Results and Discussion

This part will state out the result that will be obtained at the end of this project.

Chapter 5: Conclusion and Recommendation

This chapter will discuss about the summarization of the project and the major conclusion of the project.

1.7 Summary

The first chapter of this report is about the introduction of the project. In this chapter, the background of project was state to become more understand about the project. The problems statement was also stated in this chapter to show the purpose of developing the project. After that, the objectives of this project were 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 completing this project. Lastly, in chapter 2, literature review that related to this project will be discussed with supervisor to completing that chapter. In this chapter consist collecting data from earlier project and reading journal or article.

CHAPTER 2
LITERATURE RIVEW

2.0 Introduction

This chapter will discuss about related literature review and other important information related to this project. The information about Wi-Fi network is included to become more understanding about this project. In this chapter, the research from other person project that related to this project also included. The information of Arduino Uno is state because Arduino Uno acts as a brain in this project.

2.1 **Overview of Wi-Fi Technology** (Ajay R. Mishra, 2010)

Wi-Fi is the short name for Wireless Fidelity. It is a name of certification given by the Wi-Fi Alliance that was formerly called the WECA or Wireless Ethernet Compatibility Alliance. Wi-Fi technology was designed and optimized for Local Area Networks. Wi-Fi can be used to provide high-speed connections (11Mbps or greater) to laptop computers, desktop computers, personal digital assistants (PDAs). Wi-Fi refers to an over-the air connection with a wireless client and base between two wireless clients. Wi-Fi is freedom it allows to user to connect without wires to the internet from users to couch at home, a bed in a hotel room or a conference room at work.

Furthermore, Wi-Fi is one of the latest technology for communication which using for transmit the data or notice information directly. Wi-Fi is system of wirelessly connecting devices that use radio waves, allowing for the connection

between devices without the expense of cables or without needing them to be facing one another. Wi-Fi is a wireless technology like a cell phone. Wi-Fi enables computer to send and receive data indoors and outdoors, anywhere within the range of a base station. The best thing of all, it is fast. In fact, it`s several times faster than the fastest cable modem connection.

It operates in the unlicensed 2.4 GHz radio spectrum, uses direct-sequence spread spectrum (DSSS) for modulation, supports variable data rates up to 11Mbps, and has a range of about 50 meters. The Wi-Fi Alliance complies with the IEEE802.11 standard. These different 802.11 standards have different modes of operation, making each of these standards offer different frequency, speed and ranges. Table below show some of IEE 802.11 Standards for WIFI.

Table 2.1: Some of IEEE 802.11 Standards for Wi-Fi

STANDARD	FREQUENCY(GHz)	SPEED(Mbps)	RANGE(m)
Wi-Fi a (802.11a)	5	54	10
Wi-Fi b (802.11b)	2.4	11	100
Wi-Fi g (802.11g)	2.4	54	100

2.2 **IEEE standard** (Alan Holt, Chi-Yu Huang, 2012)

The IEEE is stand for Institute of Electrical and Electronic. IEEE is a large non-profit, professional society concerned with technological research and development. Its standards and is accredited by the American National Standard Institute (ANSI) IEEE 802 is a set of standards for local area network (LAN) technology. Table below show some of the IEEE 802 standard.

Table 2.2: Some of the IEEE 802 Standard

NUMBER	STANDARD	COMMENT
802.11	Wireless LANs	Wi-Fi
802.15	Wireless PANs	Bluetooth and Zigbee
802.16	Wireless MANs	WiMax

2.2.1 IEEE 802.11 standard (Vandana Wekhande, 2006)

IEEE 802.11 standard has its roots in Waveland, which was a proprietary wireless LAN system. It was capable of 1 or 2 Mb/s transmission rates (depending upon the wireless channel condition). It operates in infrared band and unlicensed radio frequency band. 802.11 is one of number of multi-access LAN technologies. Besides, 802.11 controls channel access through a number of coordination functions. Both contention based (active) and contention free (passive). Access techniques are specified in the standard.

In addition, 802.11 devices suffered from interoperability problems between vendors when they initially came on the market. The Alliance was formed to address interoperability issues. A number of companies formed the Wi-Fi Alliance in order to test the compliance of 802.11 equipment. Equipment that passes the compliances test is entitled to bear the Wi-Fi certification logo, which is a registered trademark of the Wi-Fi Alliance. Most 802.11 devices display the Wi-Fi logo. For this reason Wi-Fi and 892.11 devices have become synonymous.

2.3 Wi-Fi Network Architecture

The Wi-Fi network consist three main units there are Access point, Station, and PC cards. A wireless access point is all what is needed to connect all the computers in a home. The whole system would consist of DSL modem (or cable), wireless access point, firewall, router and Ethernet hub. The cable/ modem bring the Internet line at home while the router allows inter-connection between various computer/devices. Many types of routers are used based on various IEEE 802.11 recommendations, but the 802.11g is used due to its speed and reliability.