

MOBILE MAILBOX NOTIFICATION USING SENSOR



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MOBILE MAILBOX NOTIFICATION USING SENSOR

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor Of Computer Engineering Technology (Computer Systems) With Honours.

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I hereby, declared this report entitled Mobile Mailbox Notification Using Sensor is the results of my own research except as cited in references.


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APPROVAL

This report is submitted to the Faculty of Electrical and Electronic Engineering Technology of Universiti Teknikal Malaysia Melaka (UTeM) as a partial fulfilment of the requirements for the degree of Bachelor of Computer Engineering Technology (Computer System) with Honours. The member of the supervisory is as follow:



Signature:
Co-supervisor: En. Noor Mohd Ariff Bin Brahin

ABSTRAK

Di era baru ini, penggunaan teknologi dan internet sudah menjadi lumrah dalam kehidupan seharian dan ini termasuklah mengaplikasikan teknologi ini pada peti surat. Penggunaan peti surat ini di rumah mahupun pejabat masih relevan kerana masih terdapat penghantaran surat-surat penting ini secara fizikal. Oleh itu, projek ini menfokuskan pada notifikasi di peti surat kepada pengguna dan membuatnya sebagai peranti mudah alih di mana ianya akan memudahkan pengguna untuk memasang sendiri. Tujuan penyelidikan ini dijalankan adalah untuk memajukan peti surat sedia ada menggunakan sensor. Objektifnya adalah untuk mengklasifikasikan barang diterima mengikut kepentingan pengguna dan memberi jaminan akan keselamatan barang daripada kecurian. Peti surat ini menggunakan Arduino UNO sebagai mikrokontroler utama dengan bantuan ESP 8266 untuk disambungkan dengan internet. Sensor infra merah digunakan untuk mengesan keberadaan surat dan menghantar gambar yang diambil dari modul kamera kepada pemilik peti surat. Buzzer digunakan untuk memberi kesedaran kepada orang sekeliling sekiranya berlaku kecurian.

ABSTRACT

In this new era, the use of technologies and internet have become a trend in daily life and this include the need of implementation of them on mailbox. The use of mailbox either for house or office are still relevant as there is still important letter physically being sent through them. Therefore, this project focus on mailbox notification for user and make it mobilize that would be easier to install on their mailbox. The purpose of the research is to develop a mobile mailbox notification using sensor. The objective is to classify the item received by mailbox for user differentiate its importance and to guarantee the safety of the item received by mailbox from theft. The mailbox used Arduino UNO IoT development board as the main microcontroller with the help of ESP 8266 to connect it with internet. The PIR motion sensor used will detect the presence of letter and send a picture taken by camera module to mailbox owner. A buzzer is used to create awareness to people surrounding in case of theft happen.

DEDICATION

To my beloved parents;

Encik Anuar Bin Sharani and Puan Zanariah Binti Mat Yusoff.

To my supervisor and co-supervisor;

Encik Azman Bin Awang Teh and En. Noor Mohd Ariff Bin Brahin.



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LIST OF SYMBOLS

M	-	Mega = 1,000,000 (million)
G	-	Giga = 1,000,000,000 (billion)
K	-	Kilo = 1,000 (thousand)
Hz	-	Hertz
B	-	Byte
V	-	Volt



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LIST OF ABBREVIATIONS

IDE	Integrated Development Environment
API	Application Program Interface
SOC	System On a Chip
ICSP	In Circuit Serial Programming
GPU	Graphic Processing Unit
PWM	Pulse-width Modulation
USB	Universal Serial Bus
AC	Alternating Current
DC	Direct Current
CPU	Central Processing Unit
RAM	Random-access Memory
TCP/IP	Transmission Control Protocol/Internet Protocol
GSM	Global System for Mobile
LCD	Liquid Crystal Display
IoT	Internet of Things
RISC	Reduced Instruction Set Computing
FPU	Floating Point Unit
DSP	Digital Signal Processing
SD	Secure Digital (memory card type)
SRAM	Static Random-Access Memory

PIR	Passive Infrared Sensor
TTL	Transistor-transistor Logic
UART	Universal Asynchronous Receiver/Transmitter
LDR	Light Dependent Resistor
SMS	Short Message Service



CHAPTER 1

INTRODUCTION

1.1 Background

Mailbox or also known as letterbox in United Kingdom region are defined as a box in an office or outside a person's home where letters are delivered according to English Cambridge Dictionary. A brief history of mailbox, mail slots or private letterboxes were used in Paris from the late 18th century but became popular in most of Europe after the mid to late 19th century. In 1849, the Royal Mail first encouraged people to install letterboxes to facilitate the delivery of mail to home. While in Malaysia, the history of Pos Malaysia Berhad started with the establishment of postal services first in the Straits Settlements in Penang, Malacca and Singapore in the early 1800s. Then by the early 20th century, expanding through the rest of Malaya. Letters were then conveyed through dispatch riders or special messengers in charged. Fees were collected when letters were handed in at the Post Office back then instead of postage stamps.



Figure 1.1: Picture in late 80's mailing on mailbox

In this past decade, the revolutions on mails have been drastic yet the usage of the conventional mailing system is widely practice thought out the world. Most of our important letter and official documents are send by the conventional way. To make it civilised, some technologies are implemented on the mailbox to follow today's trend of internet. This project focus on mailbox notification for user and make it mobilize. Scope of people for this project are those who live in apartment and those who rarely stay at home. The mailbox will send notification to user's phone when an item are receive by the mailbox. Arduino UNO board with motion sensor will detect the item enter in the mailbox and take a picture of the item using ESP32-CAM. The picture will send directly to user phone by push notification that connected with WiFi on ESP32-CAM. A software with C or C++ language will be used to connect between Arduino and phone notification. It will be easier for user to differentiate their importance of item received without frequently checking on their mailbox.

1.2 Objective Project

The purpose of the research is to apply some technologies on existing mailbox and make it mobile:

1. To analyse the item received by mailbox for user differentiate its importance.
2. To develop a user friendly device that easy to install.
3. To guarantee the safety of the item received by mailbox from theft.

1.3 Problem Statement

In this new era full of technologies, every important letter are send through email or notification on your phone including billing. But sometime, we still use the post

services on important letter or anything that request physical invoice which require the use of mailbox. Mailbox would be the target for the postmen to place the item for those who live in apartment. Frequently check on mailbox from your high level house to mailbox area on ground floor would be tiring and nervous at the same time. So by infuse some technology on this regular mailbox would be an advantages for the owner from rushing from time to time. So this project aiming to ease home owner on their daily life.

Despite knowing your item will deliver in anytime, the owner will be notify on their smartphone but sometime spam from flyers can confuse owner when there is item placed in the mailbox. So this project aiming on how to differentiate the importance between items received by mailbox to avoid spam from flyers. A camera with certain setup will differentiate these by capture each item received by the mailbox and this will notify the owner based on its importance.

In addition, the present study was designed to study on how to install the device on mailbox which resulting on make it mobile. With the help of manual book, anyone can install this on their mailbox easily. Moreover, it can be move according to the owner, anytime and anywhere in case they want to use it on other purpose other than just place it in mailbox.

Method on how to solve parcel or item from being steal from mailbox would be one of problem arise and solution would be by improving the mailbox itself. An alarm will be set on the project in case of unwanted action happen on the mailbox and people around the mailbox will notice this. Plus, the owner will be notify too on their smartphone regarding this.

1.4 Scope of Research

Scope of research are divided into two parts which is software and hardware in order to accomplish objective of this project. The project make use Arduino Uno which will be used as microcontroller that act as head to control other components on board. For software, the program use to connect to Arduino board using C or C++ language for program assembly on Arduino integrated development environment (IDE). A simulation was run in the Arduino Integrated Development Environment and the completed circuit were install on hardware board.

The hardware part involve some components and Arduino UNO board as main board. The components use such as ESP32-CAM module, motion sensor, LDR and buzzer. The ESP32-CAM module used to capture item in the mailbox with the help of the motion sensor that trigger it. The ESP32-CAM module contain ESP32-S chip that can invoke the Bot API exposed by Telegram and trigger the process of sending the notification. Buzzer act as alarm that alert people nearby when there is unwanted action happen on the mailbox. Power supply with recommended range of 7 to 12 volts are being used to supply sufficient power to each components on the circuit.

1.5 Thesis Organization

The entire report consist of five main chapters with each one of them contain sub-heading. A brief explanation for each chapter is stated as below:

Chapter 1: Introduction

This chapter composed of background study of the project on how the problem being investigated. A quick overview of objective of project and scope of research have been stated in this chapter.