# DEVELOPMENT OF SMART ATTENDANCE SYSTEM

# WITH RASPBERRY PI AND MOBILE APPLICATION

## NUR FATIHAH BINTI NOOR ZAIDI
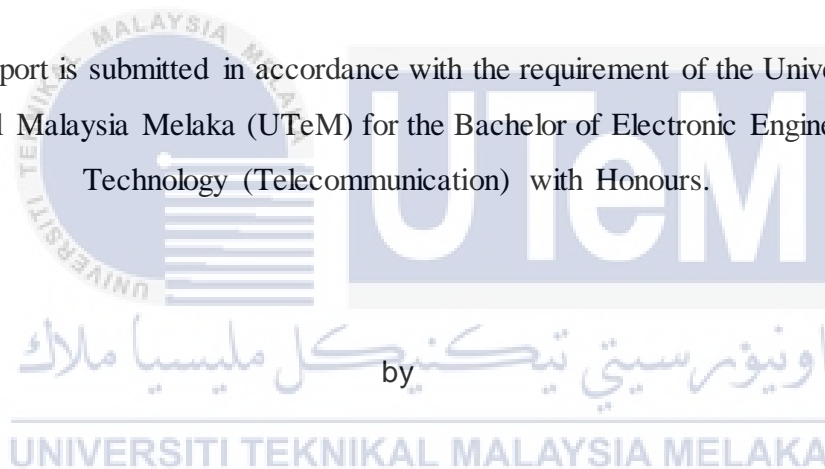## B071710660

# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## 2020

# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## DEVELEOPMENT OF SMART ATTENDANCE SYSTEM WITH RASPBERRY PI AND MOBILE APPLICATION

This report is submitted in accordance with the requirement of the Universiti Teknikal Malaysia Melaka (UTeM) for the Bachelor of Electronic Engineering Technology (Telecommunication) with Honours.

by

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FACULTY OF ELECTRICAL AND ELECTRONIC ENGINEERING
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2020

# UNIVERSITI TEKNIKAL MALAYSIA MELAKA

## BORANG PENGESAHAN STATUS LAPORAN PROJEK SARJANA MUDA

**TAJUK: DEVELOPMENT OF SMART ATTENDANCE SYSTEM WITH RASPBERRY PI AND MOBILE APPLICATION**

Sesi Pengajian: 2020

Saya **Nur Fatihah binti Noor Zaidi** mengaku membenarkan Laporan PSM ini disimpan di Perpustakaan Universiti Teknikal Malaysia Melaka (UTeM) dengan syarat-syarat kegunaan seperti berikut:

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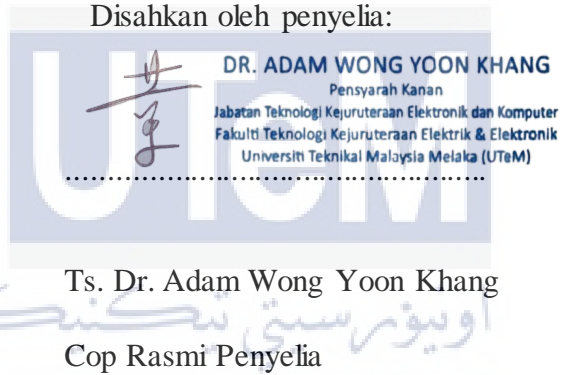
Melaka

Tarikh: 15/02/2021                                             Tarikh: 25/2/2020

## DECLARATION

I hereby, declared this report entitled DEVELOPMENT OF SMART ATTENDANCE SYSTEM WITH RASPBERRY PI AND MOBILE APPLICATION is the results of my own research except as cited in references.

Signature:

Author :      NUR FATIHAH BINTI NOOR ZAIDI

Date:          15/2/2021

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

Signature  :

Supervisor  :     Ts. Dr. Adam Wong Yoon Khang

Date      : 25/2/2020

**ABSTRAK**

Sistem kehadiran adalah sistem yang digunakan untuk mengesan kehadiran orang dan ianya boleh digunakan di industri, sekolah, institusi atau di tempat kerja. Cara tradisional mengambil kehadiran mempunyai kekurangan, iaitu data daftar kehadiran tidak dapat digunakan kembali dan mengesan kehadiran pelajar akan menjadi lebih sukar. Walau bagaimanapun, sistem ini sangat lemah kerana sebilangan pelajar mungkin dianggap remeh dengan menandatangani kehadiran orang lain dan mereka dapat memalsukan tandatangan rakan yang sebenarnya tidak hadir semasa kelas. Dengan mengambil nombor dan nama pelajar yang hadir semasa kelas memerlukan banyak masa fakulti. Kaedah ini adalah kurang cekap. Oleh itu, sistem kehadiran berasaskan teknologi seperti sensor dan sistem kehadiran berasaskan biometrik dapat mengurangkan kesalahan manusia.. Pengenalan cap jari adalah kaedah yang paling terkenal untuk mendapatkan maklumat mengenai pelajar dan ini adalah kaedah yang lebih mudah untuk mengenal pasti pelajar tersebut. Dalam laporan ini akan menerangkan kaedah untuk menghadapi masalah yang berlaku di institusi. Dengan menggunakan Raspberry Pi, ia akan memindahkan maklumat atau data sementara cap jari perkakasan disambungkan. Sistem akan menggunakan modul pengenalan cap jari untuk mendaftarkan kehadiran secara khusus. Setelah sistem mencatat kehadiran, sistem akan mengirim data ke pengkalan data dan data ini akan diambil di aplikasi web. Sementara aplikasi mudah alih akan menghantar pemberitahuan kepada ibu bapa sebagai bukti kehadiran pelajar. Hasilnya, status kehadiran pelajar dicatat dalam pangkalan data dan ibu bapa akan mendapat pemberitahuan melalui aplikasi mudah alih apabila anak mereka tidak hadir. Dalam projek ini, sistem yang dicadangkan telah dinaiktaraf dengan aplikasi mudah alih daripada hasil penyelidikan sebelumnya. Ibu bapa akan mendapat pemberitahuan mengenai status kehadiran anak mereka melalui telefon bimbit. Hasil untuk sensor cap jari mempunyai purata ketepatan sebanyak 80.57%. Sebagai kesimpulan, sistem kehadiran berasaskan teknologi dapat eningkatkan kecekapan dalam merekod kehadiran dan memudahkan kemudahannya kepada pengguna.

# ABSTRACT

Attendance system is a system that is used to track the attendance of person and applied in the industry, school, university or workplaces. The traditional way of taking attendance has disadvantage, which is the data of the attendance list cannot be reuse and tracing student's attendance is harder. However, this system is very weak because some student might take for granted by signing others attendance and they can forge a friend's signature who actually absent during classes. By taking students number and names who present during class is actually takes time and costs a lot of faculty time. This method is not efficient and this method should be replaced by fewer consuming methods time. Therefore, the technology-based attendance system such as sensors and biometrics-based attendance system can reduced human errors. Fingerprint identification is the most popular method of obtaining information about any person and it is the easier way of identifying the person. In this report, will explain the methods to face this problem that happens in every institutes. By using Raspberry Pi, it will transfer the information or data while the hardware fingerprint modules connected to it. The system will use the fingerprint identification modules to register the attendance specially. After the system record the attendance, it will send data to the database and this data will be fetched on the web application. While mobile app will send the notification to the parents as the evidence of student's attendance. As the result, the status attendance of the students is recorded in the database and parents will get the notification through mobile application when their child is absent. In this project, the propose system is compare by improving the mobile application from the previous work. The parents will get the notification of the status attendance for their child through mobile phone. The results for fingerprint sensor has the average accuracy which is 80.57%. As a conclusion, technology-based attendance system increases the efficiency in recording attendance and provide more convenient for the users.

**DEDICATION**

Parents,

Noor Zaidi Bin Ahmad Tajudin and Rosmawati Binti Mohamad

Dedicated to each of you for never being discouraged by unwavering enthusiasm and pride. I pray for both of you live in healthy and happy forever.

Siblings

Muhamad Mustaqeem, Muhamad Hafidzul Haqiem and Nur Alyana Sofia

Thank you for giving a lots of support and advice. Becomes a happy bond of the hereafter. Hopefully they can success in their respective career.

Supervisor

Ts. Dr. Adam Wong Yoon Khang

Dedicated in thankful appreciation for your supporting, guidance and helps. I hope you are in the good health

Course mates

BEET 2017/2018

Thank you for being with me throughout the learning proses here.

# ACKNOWLEDGEMENT

First of all, I would like to express millions of compliments and thank to Allah SWT for His strength and blessings given to me in completing this project. Secondly, I would like to thank Universiti Teknikal Malaysia Melaka (UTeM) for giving me a valuable opportunity to implement this project. I also would like to thank to my supervisor, Mr. Ts. Dr. Adam Wong Yoon Khang for endless guidance, motivation and support as well as encouragement given during this project. My deepest gratitude to my whole family especially to my father and mother for their endless blessings, love and moral support. I would like to thanks to all my friends for their valuable support and assistance over the years. Finally, my appreciation also extended to all parties involved either directly or indirectly to this project.

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# LIST OF ABBREVIATION

LCD          -          Liquid Crystal Display

USB          -          Universal Serial Bus

TTL          -          Time to Live

IOS          -          Internet Operating System

RFID         -          Radio Frequency Identification

Wi-Fi        -          Wireless Fidelity

CTI          -          Computer Telephone Interface

ISDN – PRI   -          Integrated Services Digital Network – Primary Rate Interface

IDE          -          Integrated Development Environment

GUI          -          Graphical User Interface

PHP          -          Personal Home Page

RDBMS        -          Relational Database Management System

CSS          -          Cascading Style Sheets

SQL          -          Structured Query Language

HTML         -          Hypertext Markup Language

ID           -          Identification

# LIST OF APPENDICES

# CHAPTER 1

# INTRODUCTION

## 1.0 Introduction

The first chapter present the idea of the project. It focuses on the background of the project, the problem statement, the objectives, scopes and project.

## 1.1 Research Background

Taking the student attendance at the institute is a tedious process. By using the traditional student attendance method, the teacher will take the students by calling names or signed on the paper. This method is less effective as there are weaknesses likes student can duplicate the signing and teacher might not alert if the student does not come during the class. The teacher needs to key in attendance twice because the presentation should be kept in the database. Their work should not be focused on managing the presence alone, as they also have other work to do. When it comes to participation using QR code, its benefits are based on its ability to be scanned by a smartphone, and it might be that some students do not bring smartphones into the classroom. Some of the mobile devices are not user-friendly such as iPhone and might not detect the QR code from a distance. During class, it will be a difficulty if students sit far behind to scanning QR code because QR code cannot be scanned from a range. The time teaching will be interrupted by having to wait for all students to scan the QR code. Sifatnur Rahman et al. (2018) in research article 'Automated Student Attendance System using Fingerprint Recognition' say that with the advent of advanced technology, the biometric recognition system is widely used for the unique identification of humans. A biometric system can be an 'identification' system or 'verification' system. Several biometric features are used for user verification likes iris recognition (visual biometric), face recognition (visual biometric), fingerprint recognition (visual biometric), speech recognition (auditory biometric), etc. Biometric features cannot be duplicated; thus, it can eliminate time theft. So, it can be seen

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that by recording the attendance manually or using QR code or fingerprint, all three have their pros and cons.

## 1.2    Problem Statement

Nowadays, taking a paper-based attendance is not as efficient as it can be cheated if the student is absent. The presence needs to be updated in the database computer, and it will be wasting time for the teacher to update the attendance. Besides, the teacher may miss if their students are skipping the classroom (Varun Panditpautra, 2019). Therefore, the biometric system (fingerprint recognition) can be a solution for the teacher to record student attendance.

## 1.3 Project Objective

The aims for this project are:

a) To record the attendance of student and changing into comparable template using Fingerprint Sensor.
b) To develop database system for fingerprint sensor.
c) To develop mobile application for monitor attendance student.

## 1.4 Scopes

The scopes of this project are:

a) Use fingerprint scanner to verify the identification of users.
b) Develop database system that can monitor the attendance and send notification to parents when their child is absent.
c) Use Thunkable develop software to build application that can be used in smartphone.

## 1.5    Project Deliverables

This project has two main parts in its production, software and hardware. This project has also been divided into two sections, Part 1 (PSM1) and Part 2 (PSM2). In the process of completing Part 1, hardware and software are simultaneously made to meet the specified time.

Part 1 (PSM 1) begins in February 2020 and ends in June 2020. The key issues contained in PSM 1 include the project title, introduction, problem statement, objective, scope, literature review and methodology. Students should also present a presentation to the panel to obtain confirmation from them to proceed with the project.

Part 2 (PSM 2) begins in August 2020 and ends in January 2020. The important thing contained in PSM2 is the result, discussion, conclusion and recommendation. At present, it is also crucial to ensure that the project is fully completed to be evaluated by the panel. All the changes made during project production should be included in the report.

Finally, the reports on Part 1 and Part 2 are combined and bound completely.

## 1.6    Gantt chart

A Gantt chart depicts the activities that should be done to achieve the objectives of the project which is come up with an analysis. The Gantt chart divided into two sections, PSM1 and PSM2. The Gantt chart is attached in the appendix.

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## 1.7    Conclusion

As a conclusion, this chapter described the overview of the background of the project, problem statement, the objectives, the scopes, methodology, project deliverables and Gantt chart.
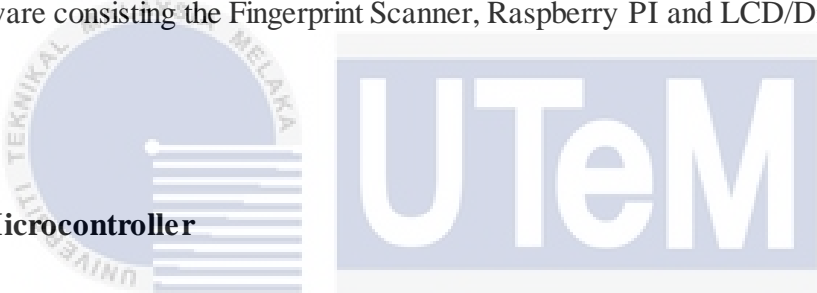
# CHAPTER 2

# LITERATURE REVIEW

## 2.0 Introduction

This section will show the survey or research of the project by reviewing the theses, journals, research papers and other sources. The literature review is to examine the work of others before starting the examination work to obtain sufficient data and information on related with the projects concluded by others. Below the previous study that is done by previous research.

## 2.1 Hardware-Software Level Design

Proposed hardware consisting the Fingerprint Scanner, Raspberry PI and LCD/Display Module (optional).

### 2.1.1 Microcontroller

A microcontroller is something important in various sectors, especially in controlling a system. It can manage electrical and electronic component requirements following the instructions given in specific languages. The system will proceed according to the instructions provided. Some of the journals mention the benefit of using a microcontroller (Al-Dhaher, 2001), (John Crisp, 2003) and (Ying Bai, 2016). According to Hussain M et al. (2016) in the report 'Programming A Microcontroller', stated that microcontroller is used to perform a specific task and execute a single application. There is such automatically controlled product commonly use such as remote control, automatic engine control system, power tool and office machine.

**Table 2.0:** Microcontroller that used in biometric attendance system

| Year | Authors | Biometric | Microcontroller |
|------|---------|-----------|-----------------|
| 2015 | Mazhar et al. | Fingerprint | ATmega 2560 |
| 2015 | Mittal et al. | Fingerprint | Atmega 328/Arduino UNO |
| 2015 | Kamaraju and Kumar | Fingerprint | A DSP – BF532 |
| 2016 | Gadhave and Kore | Fingerprint | Broadcom BCM2835 ARM11/Raspberry Pi |
| 2016 | Rajkumar and Prakash | Face | Broadcom BCM2836 ARM Cortex-A7/Raspberry Pi 2 ModelB |
| 2016 | Ahmed et al. | Fingerprint | Atmega 2560/Arduino Mega |
| 2017 | Dhanalakshmi et al. | Fingerprint | ARM Cortex-A5/AtmelSAMA5D31 |
| 2018 | Yusof et al. | Face | Broadcom BCM2837B0 ARM Cortex-A53/Raspberry Pi 3 Model B+ |
| 2018 | Salim et al. | Face | Broadcom BCM2837 ARM Cortex-A53/Raspberry Pi 3 Model B |