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DEVELOPMENT OF SMART CLASS ATTENDANCE BY USING FACIAL RECOGNITION

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DEVELOPMENT OF SMART CLASS ATTENDANCE BY USING FACIAL RECOGNITION

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Bachelor of Computer Engineering Technology (Computer Systems) with Honours

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A thesis submitted
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DECLARATION

I declare that this project entitled " Development Of Smart Class Attendance By Using Facial Recognition " is the result of my own research except as cited in the references. The project report has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

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APPROVAL

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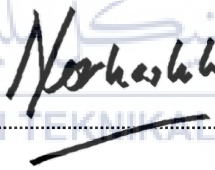
Date : 14 February 2021

Signature : 

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DEDICATION

Dedicated to my beloved father, mother

brothers and sisters…

ABSTRACT

Nowadays, attendance management of students using the conventional methods had been a challenge to a lecturers or teachers especially with a large number of students. It is not only a time-consuming task, but it can be a burden to the lecturers or teachers. Besides, due to the large number of students, there is always a possibility of proxies and fake attendance. Hence, several automated attendance systems are using biometric verification have been proposed. Facial recognition technology is one of the biometric methods and is widely used in the attendance management system. By using the facial recognition technique, issues such as proxies and fake attendance can be avoided and most importantly is timesaving. However, previously proposed systems have some drawbacks such as lightning of the images, noise from the camera, and the angle of student face that made the attendance management ineffective and inefficient. Therefore, this paper proposes high speed and accurate attendance management using facial recognition techniques. In this paper, Raspberry Pi 4, Pi camera and dlib's algorithm are utilized as a microcontroller, camera and algorithm for facial recognition, respectively. During the attendance taking session, student's face that captured by the camera is identified in the database. Once it has been identified, student's attendance is recorded in the system. Then, an email is sent to student's parent as a notification for their attendance in class. From the experimental results, the captured student's face is successfully recognized, and attendance is successfully recorded in the system. Besides, time taken for parents received a notification email once attendance is recorded is about 3.8s if a total student in class is 30 students.

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ABSTRAK

Pada masa kini, pengurusan kehadiran pelajar menggunakan kaedah lama telah menjadi satu cabaran kepada pensyarah atau guru terutamanya dengan sebilangan besar pelajar. Ia bukan sahaja satu tugas memakan masa, tetapi ia boleh jadi satu beban kepada pensyarah atau guru. Selain itu, disebabkan bilangan pelajar yang ramai, sentiasa ada satu kemungkinan proksi dan kehadiran palsu. Maka, beberapa sistem kehadiran automatik menggunakan pengesahan biometrik telah dicadangkan. Teknologi pengenalpastian wajah ialah salah satu kaedah-kaedah biometrik dan digunakan dengan meluas dalam sistem pengurusan kehadiran. Dengan menggunakan teknik pengenalpastian wajah, isu seperti proksi dan kehadiran palsu dapat dielak dan yang lebih penting ialah jimat masa. Bagaimanapun, sistem yang dicadangkan sebelum ini mempunyai sedikit kelemahan seperti pencahayaan imej, gangguan bunyi dari kamera, dan sudut muka pelajar yang membuat pengurusan kehadiran tidak berkesan dan tidak cekap. Lantaran itu, kertas ini mencadangkan kelajuan yang tinggi dan pengurusan kehadiran yang tepat menggunakan teknik-teknik pengenalpastian wajah. Dalam kertas ini, Raspberry Pi 4, Pi kamera dan algoritma dlib digunakan sebagai satu mikropengawal, kamera dan algoritma untuk pengenalpastian wajah, masing-masing. Semasa mengambil sesi kehadiran, wajah pelajar yang ditangkap oleh kamera dikenalpasti dalam pangkalan data. Sebaik sahaja ia telah dikenalpasti, kehadiran pelajar direkodkan dalam sistem. Kemudian, satu emel dihantar ke penjaga pelajar sebagai satu pemberitahuan untuk kehadiran mereka dalam kelas. Dari hasil percubaan, muka pelajar ditangkap dan berjaya dikenalpasti, dan kehadiran dengan berjaya direkodkan dalam sistem. Selain itu, masa yang diambil untuk penjaga menerima emel pemberitahuan sebaik sahaja kehadiran direkodkan lebih kurang 3.8s jika keseluruhan pelajar dalam kelas ialah 30 orang pelajar.

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By the Name of ALLAH S.W.T, the Most Gracious and the Most Merciful

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UNIVERSITI TEKNIKAL MALAYSIA MELAKA

TABLE OF CONTENTS

PAGE

DECLARATION

APPROVAL

DEDICATION

ABSTRACT ii

ABSTRAK iii

ACKNOWLEDGEMENTS iv

TABLE OF CONTENTS v

LIST OF TABLES viii

LIST OF FIGURES ix

LIST OF APPENDICES xii

LIST OF SYMBOLS xiii

LIST OF ABBREVIATIONS xiv

CHAPTER 1 INTRODUCTION 15

1.1 Background 15

1.2 Problem statement 16

1.3 Project objectives 17

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

1.4 Project scopes 17

1.5 Project significance 18

CHAPTER 2 LITERATURE REVIEW 22

2.1 Introduction 22

2.2 Student Attendance System 22

2.3 Summary of the previous works 29

2.4 Hardware & Software 32

CHAPTER 3 RESEARCH METHODOLOGY 35

3.1 Introduction 35

3.2 System Architecture 37

3.3 System Process Flow 43

3.3.1 Hardware Process Flow 43

3.3.2 Software Process Flow 45

CHAPTER 4 RESULT AND DISCUSSION 49

4.1 Structure of Database 49

4.2 Homepage of Smart Class Attendance 51

4.3 Login page for Admin 52

4.3.1 Directory page for Admin 52

4.3.1.1 Lecturer panel page 53

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

4.3.1.2 Student panel page 54

4.4 Login page for Faculty 55

4.4.1 Directory page for Faculty 56

4.4.1.1 Attendance page 56

4.4.1.2 View report page 58

4.4.1.3 View students page 59

4.5 Surveillance program 60

4.6 Prototype of the project 61

4.7 Analysis of Data 61

4.7.1 Range of face captured clearly by the Pi Camera 62

4.7.2 Time taken to receive email message from system. 65

4.7.3 The range of PIR Sensor. 66

4.8 Limitation 67

CHAPTER 5 CONCLUSION AND RECOMMENDATION 68

5.1 Conclusion 68

5.2 Recommendation 69

5.3 Project potential of commercialization 69

REFERENCE 70

APPENDICES 71

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

LIST OF TABLES

TABLE	TITLE	PAGE
Table 2.1	The advantages and disadvantages of various identification system	29
Table 3.1	List of material and equipment	38
Table 3.2	Cost of equipment	41
Table 4.1	The range of Pi Camera can capture face clearly	62
Table 4.2	Time taken for mail notification per students received	65
Table 4.3	The range of PIR Sensor detect the presence of students	66

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

LIST OF FIGURES

FIGURE **TITLE** **PAGE**

Figure 1.1 The percentage for respondents state the reasons. 19

Figure 1.2 The percentage for the system could track or record student attendance. 20

Figure 1.3 The percentage for system contribute to the green environment and security. 20

Figure 1.4 The percentage for system eliminate the proxy and unnecessary time wasting. 21

Figure 1.5 The percentage for system can notify message to parents in case of absentees. 21

Figure 2.1 The block diagram of the Attendance System by using Face Detection & Face Recognition (Kowsalya et al., 2019). 24

Figure 2.2 Flowchart for module QR attendance system. 27

Figure 2.3 Process of Iris recognition system. 29

Figure 2.4 Raspberry Pi 4 32

Figure 2.5 Pi Camera v1.3 33

Figure 2.6 7-inch LCD Module Screen Display 33

Figure 2.7 Raspbian Programming Language 34

Figure 2.8 MySQL software 34

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Figure 3.1 Project Flowchart 36

Figure 3.2 Architecture of the project 37

Figure 3.3 Block Diagram of project 37

Figure 3.4 Raspberry Pi 4 4gb Ram 38

Figure 3.5 Pi Camera v1.3 39

Figure 3.6 7-inch LCD Module Screen Display 39

Figure 3.7 PIR Motion Sensor 39

Figure 3.8 LED 40

Figure 3.9 Wire Jumper 40

Figure 3.10 Breadboard 40

Figure 3.11 MySQL Software 40

Figure 3.12 Raspbian programming language 41

Figure 3.13 Laptop/Computer 41

Figure 3.14 Raspberry Pi 4 GPIO Header 42

Figure 3.15 Raspberry Pi 4 casing box 43

Figure 3.16 Flowchart of hardware 44

Figure 3.17 Flowchart of face database 46

Figure 3.18 Flowchart of attendance phase 47

Figure 3.19 Elements on Smart Class Attendance webpage 48

Figure 4.1 Database design for the system 49

Figure 4.2 Database design for “admin_login” 50

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Figure 4.3 Database design for “student_login” 50

Figure 4.4 Database design for “teacher_login” 50

Figure 4.5 Homepage view 51

Figure 4.6 Admin login window 52

Figure 4.7 Admin Directory 53

Figure 4.8 Sign up lecturers 53

Figure 4.9 Warning field for sign up lecturers 54

Figure 4.10 Sign up students 54

Figure 4.11 Warning field for sign up students 55

Figure 4.12 Faculty login window 55

Figure 4.13 Faculty Directory 56

Figure 4.14 Attendance taking 57

Figure 4.15 Spoofing detected 57

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

Figure 4.16 Trained model not registered 57

Figure 4.17 Report Attendance 58

Figure 4.18 Email notification 58

Figure 4.19 Student Information 59

Figure 4.20 Update Student Information 59

Figure 4.21 Surveillance using Telegram bot 60

Figure 4.22 Model of the Project’s prototype 61

LIST OF APPENDICES

APPENDIX	TITLE	PAGE
Appendices 1	Milestone of project	71
Appendices 2	Gantt chart of project	72
Appendices 3	Questionnaire of project	73

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LIST OF SYMBOLS

% - Percentage

& - And

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LIST OF ABBREVIATIONS

RFID	Radio Frequency Identification
PIN	Personal Identification Number
QR CODE	Quick Response code
RPi	Raspberry Pi
SV	Supervisor
m	Metre
cm	Centimetre
fps	Frame per Second
GB	Gigabyte
V	Voltage

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CHAPTER 1

INTRODUCTION

1.1 Background

The Smart Class Attendance System by using facial recognition proposed is developed based on the Internet of Things (IoT). IoT describes as a network of physical object which is mainly concerned with the variety of devices being interconnected solely within the existing infrastructure being shared between them. It can be seen as a nervous system that binds everything together and can be achieved by performing simulations and processors integrated with physical objects to retrieve information in real-time. Collected data will be analyzed where smart decisions are taken by computers without human interference, whether to overcome the real problem or to improve the existing situation. In simple, IoT improves several existing systems to make them more efficient and intelligent.

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Nowadays, the facial recognition technique is conventional, owing to its efficiency and impressive showing. A lot of enhancement has been made in previous few years resulting the system is widely used for industrial and security purpose. Similarly, the facial recognition technique can be applied to the school or higher institutions to track the presence of students in class. Hence, a facial recognition attendance system will serve as a solution to the challenge and add great heights of simplicity for tracking student's attendance. In spite of, manual entry of attendance in attendance's list that consumed a lot of time, face detection and recognition algorithm mechanically detect the students and

manage the attendance is more efficient. Throughout the enrolling of a students, the students' needs to train by taking multiple images of a student's alongside his/her id and name conjointly. The appearance of each student will be uploaded into the database, and the lecturers can track their attendance on the webpage. Therefore, this method provides accurate and detailed results in an interactive way to the user instead of conventional attendance systems.

1.2 Problem statement

The conventional student attendance system commonly faces many problems such as accuracy of data collected, time-consuming and no backup or memory to record attendance. According to the conventional attendance system, the most crucial issue is the accuracy of the data collected. This can be as a result of the attendance sheet is passed around the class during the lecture sessions which leads to a fake and proxy attendance. On the other hand, the conventional attendance system is time consuming. Considering there is a huge number of students present in a lecture hall and the time required for a student to sign his or her attendance on a two to three pages list of names is approximately 30 seconds, in half an hour, only about 60 students can sign the attendance. This matter will disrupt the learning process and causes students to be distracted.

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Besides that, there is no backup or memory to record the attendance once the lecturer had lost the hardcopy of attendance list. For example, around the whole of the semester, the lecturer will only collect and validate the attendance of students based on a sheet of paper. So, before the end of the semester that attendance is important to be uploaded in the institutional system by a lecturer to produce a report. However, if the

lecturer had lost the attendance sheet means all the record of student attendance will be lost and can cause some trouble to enter correct data of the whole semester. Moreover, it may cause waste of paper since lecturers have to reprint the attendance sheet multiple times due to several causes such as additional of new students, students drop, or attendance lost.

Thus, this system attendance by using facial recognition is proposed to replace the conventional attendance of the presence of students who are troublesome and affect students to be distracted to take part in each other's attendance. As a result, the previous system needs to be developed to improve effectiveness, data integrity, and make information accessible with those legitimate parties.

1.3 Project objectives

The objectives of this project are as follow:

1. To study the features of an algorithm with a low-cost system to recognize the identified student by using facial recognition technique.
2. To develop a smart class attendance based on facial recognition technique using Raspberry Pi.
3. To evaluate the functionality and the effectiveness of the system.

1.4 Project scopes

The scopes of this project are as follow:

1. Investigation on possible methods and solutions for the attendance management system to the students and staff of an institution.

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