



FACE RECOGNITION ATTENDANCE SYSTEM WITH AUTOMATION

UNDERGRADUATE THESIS

**Submitted as one of the requirements to obtain
Sarjana Komputer**

By:

SINAGA, YOHANES FRANSISKO

001202000162

**FACULTY OF COMPUTING
INFORMATICS STUDY PROGRAM**

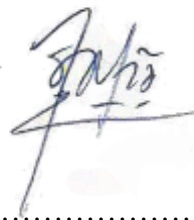
CIKARANG

MAY, 2023

PANEL OF EXAMINER APPROVAL

The Panel of Examiners declare that the undergraduate thesis entitled **Face Recognition Attendance System with Automation** that was submitted by Sinaga, Yohanes Fransisko majoring in Informatics from the Faculty of Computing was assessed and approved to have passed the Oral Examination on 9 May 2023.

Panel of Examiner



.....
Abdul Ghofir, S.Kom., M.Kom.



.....
Dr. Hasanul Fahmi, S.Kom., M.Kom.



.....
Cutifa Safitri, Ph.D.

STATEMENT OF ORIGINALITY

In my capacity as an active student of President University and as the author of the undergraduate thesis/final project/business plan (underline that applies) stated below:

Name : Sinaga, Yohanes Fransisko

Student ID number : 001202000162

Study Program : Informatics

Faculty : Computing

I hereby declare that my undergraduate thesis/final project/business plan entitled "**FACE RECOGNITION ATTENDANCE SYSTEM WITH AUTOMATION**" is, to the best of my knowledge and belief, an original piece of work based on sound academic principles. If there is any plagiarism, including but not limited to Artificial Intelligence plagiarism, is detected in this undergraduate thesis/final project/business plan, I am willing to be personally responsible for the consequences of these acts of plagiarism, and accept the sanctions against these acts in accordance with the rules and policies of President University.

I also declare that this work, either in whole or in part, has not been submitted to another university to obtain a degree.

Cikarang, May 2023



Sinaga, Yohanes Fransisko

SCIENTIFIC PUBLICATION APPROVAL FOR ACADEMIC INTEREST

As a student of the President University, I, the undersigned:

Name : Sinaga, Yohanes Fransisko
Student ID number : 001202000162
Study program : Informatics

for the purpose of development of science and technology, certify, and approve to give President University a non-exclusive royalty-free right upon my final report with the title:

FACE RECOGNITION ATTENDANCE SYSTEM WITH AUTOMATION

With this non-exclusive royalty-free right, President University is entitled to converse, to convert, to manage in a database, to maintain, and to publish my final report. There are to be done with the obligation from President University to mention my name as the copyright owner of my final report.

This statement I made in truth.

Cikarang, May 2023



Sinaga, Yohanes Fransisko

ADVISOR'S APPROVAL FOR PUBLICATION

As a lecturer of the President University, I, the undersigned:

Advisor's Name : Cutifa Safitri, Ph.D.
NIDN : 20190900815
Study program : Informatics
Faculty : Computing

declare that following thesis:

Title of undergraduate thesis : **FACE RECOGNITION ATTENDANCE SYSTEM
WITH AUTOMATION**
Undergraduate Thesis author : Sinaga, Yohanes Fransisko
Student ID number : 001202000162

will be published in **journal / institution's repository / proceeding / unpublsh.**

Cikarang, May 2023



Cutifa Safitri, Ph.D.

FACE RECOGNITION ATTENDANCE SYSTEM WITH AUTOMATION

ORIGINALITY REPORT

5%

SIMILARITY INDEX

5%

INTERNET SOURCES

2%

PUBLICATIONS

0%

STUDENT PAPERS

PRIMARY SOURCES

1	www.coursehero.com Internet Source	1%
2	scholarbank.nus.edu.sg Internet Source	1%
3	www.pyimagesearch.com Internet Source	<1%
4	eprints.usm.my Internet Source	<1%
5	"Driver Drowsiness Detection System using Machine Learning Algorithms", International Journal of Recent Technology and Engineering, 2020 Publication	<1%
6	AKM Jahangir Majumder, Joshua Aaron Izaguirre. "A Smart IoT Security System for Smart-Home Using Motion Detection and Facial Recognition", 2020 IEEE 44th Annual Computers, Software, and Applications Conference (COMPSAC), 2020 Publication	<1%

Stats

Average Perplexity Score: 297.846

A document's perplexity is a measurement of the randomness of the text

Burstiness Score: 924.127

A document's burstiness is a measurement of the variation in perplexity

Your sentence with the highest perplexity, "*Final Project Advisor Cutifa Safitri, Ph.D.*", has a perplexity of: 4797

ABSTRACT

This thesis describes a face recognition attendance system that utilizes the Local Binary Patterns Histogram algorithm for the face recognition and Flask framework for the backend server and the automation. The primary objective is to create a system that is more efficient for the education sector which now the manual attendance system is still widely used in this sector. The automation is to send an attendance report to the person in charge, which could be the lecturer, teacher, or admin person. The tool used in this thesis for the system is Python for the programming language as it is commonly used in machine learning. XAMPP to handle the database, Flask framework to handle the backend server, and connect with the database. The benefit of this thesis is enabling the education sector to implement the attendance system efficiently with less cost as the development of the system used open-source frameworks and also the improvement in the attendance system. The result of this thesis is a face recognition system is that it works as expected with the features listed in the system overview as the parameter.

Keywords: Face Recognition, Attendance System, Automation

ACKNOWLEDGEMENT

Praise be to God Almighty who still gives us the blessings of strength and health so that the author can complete this final project thesis. Not to forget, the author also expresses his deepest gratitude to each party who has supported and assisted the author during this thesis final project. The author is also expresses his gratitude to:

1. God Almighty which has blessed me with the knowledge and patience to the author to complete this thesis final project in a timely manner.
2. Both parents who have prayed and provided encouragement and support in writing the final project thesis completion.
3. Ms. Cutifa Safitri as a thesis advisor at the Faculty of Computing President University who have helped a lot and gave advice and insight to the author in this final project thesis development.
4. Friends who always give support and assistance to the author to write this final project thesis and the project development.

TABLE OF CONTENTS

ABSTRACT.....	i
DEDICATION.....	ii
ACKNOWLEDGEMENT.....	iii
TABLE OF CONTENTS.....	iv
LIST OF TABLES.....	viii
LIST OF FIGURES.....	ix
1 CHAPTER I INTRODUCTION.....	1
1.1 Background.....	1
1.2 Problem Statement.....	2
1.3 Objectives.....	2
1.4 Scope and Limitations.....	3
1.4.1 Scope.....	3
1.4.2 Limitations.....	3
1.5 Project Methodology.....	3
1.6 Final Project Outline.....	4
2 CHAPTER II LITERATURE REVIEW.....	6
2.1 Face Recognition.....	6
2.2 LBPH Algorithm.....	7
2.3 Haar Cascade Classifier.....	9
2.4 DLIB Algorithm.....	10
2.5 Attendance System.....	12
2.6 Automation.....	12
2.7 Attendance Report.....	13

2.8	Related Works	14
2.8.1	Kent Cam.....	14
2.8.2	Farelock.....	14
3	CHAPTER III SYSTEM ANALYSIS.....	16
3.1	System Overview	16
3.2	Use Case Diagram.....	17
3.3	Use Case Narrative.....	18
3.4	Swim Lane Diagram.....	28
3.4.1	Swim Lane Diagram for Main Menu Page	28
3.4.2	Swim Lane Diagram for Attendance System.....	29
3.4.3	Swim Lane Diagram for Register to the System.....	29
3.4.4	Swim Lane Diagram for Login to the System.....	30
3.4.5	Swim Lane Diagram for Admin Receive Report File through E-mail	30
3.4.6	Swim Lane Diagram for Anti-Spoofing Mechanism.....	31
3.4.7	Swim Lane Diagram for User See Attendance History and Analytics	31
3.4.8	Swim Lane Diagram for Login Admin and Admin Menu Page ..	32
3.4.9	Swim Lane Diagram for User and Admin Logout.....	32
3.4.10	Swim Lane Diagram for Admin Perform Filter Data	33
3.5	Hardware and Software Requirement	33
3.5.1	Hardware Requirement	33
3.5.2	Software Requirement.....	34
4	CHAPTER IV SYSTEM DESIGN.....	35
4.1	User Interface Design.....	35
4.1.1	Main Menu	35
4.1.2	User Search History Login Form	37
4.1.3	User Menu	39

4.1.4	Admin Login Form.....	40
4.1.5	Administrator Menu	41
4.1.6	Register Menu	42
4.1.7	Generate Dataset Menu	43
4.2	Class Diagram	44
5	CHAPTER V SYSTEM IMPLEMENTATION.....	45
5.1	User Interface	45
5.1.1	Main Menu	45
5.1.2	User Login Menu Page.....	46
5.1.3	User Menu	47
5.1.4	Admin Login Menu Page.....	48
5.1.5	Administrator Menu	49
5.1.6	Register Menu Page	50
5.1.7	Generate Dataset Menu	51
5.1.8	Automatic Send Report	51
5.1.9	Eye Blink Detection as Anti-spoofing mechanism	52
5.2	Application Details.....	53
5.2.1	Main Menu	53
5.2.2	User Login Menu	64
5.2.3	User Menu	65
5.2.4	Admin Login Menu.....	66
5.2.5	Admin Menu	66
5.2.6	Register Menu Page	67
5.2.7	Generate Dataset Menu	68
5.2.8	Automatic Send Report	74
5.2.9	Eye Blink Detection as Anti-spoofing mechanism	77
6	CHAPTER VI SYSTEM TESTING.....	81

6.1	Testing Environment.....	81
6.1.1	Testing Scenario.....	81
6.2	Testing Summary	83
7	CHAPTER VII CONCLUSION AND FUTURE WORKS	84
7.1	Conclusion.....	84
7.2	Future Works.....	84
8	REFERENCES	86

LIST OF TABLES

Table 2.1 Related Works.....	15
Table 3.1 Table of Function Description	16
Table 3.2 Use Case Narrative for “Access Main Menu Page”	18
Table 3.3 Use Case Narrative for “Use Attendance System”	19
Table 3.4 Use Case Narrative for “Register to the System”	20
Table 3.5 Use Case Narrative for “Login to the System”	21
Table 3.6 Use Case Narrative for “Admin Receive Report File through E-mail”	22
Table 3.7 Use Case Narrative for “Blink as Anti-spoofing Mechanism”	23
Table 3.8 Use Case Narrative for “User See Attendance History and Analytics”	24
Table 3.9 Use Case Narrative for “Admin Login and Access Admin Menu”	25
Table 3.10 Use Case Narrative for “User and Admin Logout”	26
Table 3.11 Use Case Narrative for “Admin Filter Data in Admin Page”	27
Table 4.1 Table Description from Figure 4.1	36
Table 4.2 Label Description from Figure 4.2	38
Table 4.3 Users History and Analytics	39
Table 4.4 Description from Figure 4.4.....	40
Table 6.1 Testing scenario table result	81

LIST OF FIGURES

Figure 2.1 LBP Operation [3]	8
Figure 2.2 Extracting Histogram [3]	8
Figure 2.3 Sample Haar Features in Original Research [4]	9
Figure 2.4 Facial Landmarks [7]	11
Figure 2.5 Eye aspect ratio function	11
Figure 3.1 Use Case Diagram	17
Figure 3.2 Swim Lane Diagram of Main Menu Page	28
Figure 3.3 Swim Lane Diagram of Attendance System	29
Figure 3.4 Swim Lane Diagram of Register to the System	29
Figure 3.5 Swim Lane Diagram of Login to the System	30
Figure 3.6 Swim Lane Diagram of Automatic Send Report to Admin E-mail.....	30
Figure 3.7 Swim Lane Diagram of Anti-Spoofing Mechanism.....	31
Figure 3.8 Swim Lane Diagram of User See Attendance History and Analytics.....	31
Figure 3.9 Swim Lane Diagram of Login Admin and Admin Menu Page.....	32
Figure 3.10 Swim Lane Diagram of User and Admin Logout	32
Figure 3.11 Swim Lane Diagram of Admin Filter Data	33
Figure 4.1 Main Menu Interface Page Design	35
Figure 4.2 User Search History Login Page Design	37
Figure 4.3 Users Menu Page Design.....	39
Figure 4.4 Admin Login Page Design	40
Figure 4.5 Administrator Menu Page Design	41
Figure 4.6 Register Menu Page Design	42
Figure 4.7 Generate Dataset Menu Page Design	43
Figure 4.8 Class Diagram of The Application	44
Figure 5.1 Main Menu Interface	46
Figure 5.2 Login Menu Interface	47
Figure 5.3 User Menu Interface	48
Figure 5.4 Admin Login Menu Interface	48
Figure 5.5 Admin Menu Interface	49
Figure 5.6 Register Menu Interface	50
Figure 5.7 Generate Dataset Menu Interface	51

Figure 5.8 Generate Dataset Menu Interface	53
Figure 5.9 Live Webcam in HTML	53
Figure 5.10 Route for taking the live webcam.....	54
Figure 5.11 Code for face recognition 1	54
Figure 5.12 Code for Face Recognition 2.....	55
Figure 5.13 Code for checking the confidence	57
Figure 5.14 Code for eye blink	58
Figure 5.15 Facial landmarks.....	58
Figure 5.16 Code for Yield	59
Figure 5.17 Code for attendance table	60
Figure 5.18 Ajax function 1	61
Figure 5.19 Ajax function 2	62
Figure 5.20 Scanning today's attended function.....	63
Figure 5.21 Load attendance data function.....	64
Figure 5.22 Route to render the user login page	64
Figure 5.23 Code for login validation.....	65
Figure 5.24 Admin validation function.....	66
Figure 5.25 Register user function.....	67
Figure 5.26 Register user submit route	68
Figure 5.27 Route for generate dataset	68
Figure 5.28 Generate dataset HTML	69
Figure 5.29 Capture data route.....	69
Figure 5.30 Generate dataset function	70
Figure 5.31 Training dataset function.....	72
Figure 5.32 Automation function.....	74
Figure 5.33 Send email function.....	75
Figure 5.34 Initialize detector and predictor.....	77
Figure 5.35 Initialize eyes variable	77
Figure 5.36 Looping through eyes variable	78
Figure 5.37 Facial Landmarks [7].....	79
Figure 5.38 Calculate eye aspect ratio function.....	79
Figure 5.39 Calculate eye value	80