

**APPLICATION OF FACE MASK RECOGNITION AND BODY
TEMPERATURE SENSOR FOR ATTENDANCE MACHINE**

By

Muhammad Rifki Hartanto
11501064

BACHELOR'S DEGREE
in

MECHANICAL ENGINEERING – MECHATRONICS CONCENTRATION
FACULTY OF ENGINEERING AND INFORMATION TECHNOLOGY



SQU[®]
SWISS GERMAN UNIVERSITY

SWISS GERMAN UNIVERSITY
The Prominence Tower
Jalan Jalur Sutera Barat No. 15, Alam Sutera
Tangerang, Banten 15143 - Indonesia

Revision After Thesis Defense on 04 January 2021

STATEMENT BY THE AUTHOR

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

Muhammad Rifki Hartanto

Student

Date

Approved by:

Dr. Rusman Rusyadi

Thesis Advisor

Date

Dr. Maulahikmah Galinium, S.Kom., M.Sc.

Dean

Date

Muhammad Rifki Hartanto

ABSTRACT

APPLICATION OF FACE MASK RECOGNITION AND BODY TEMPERATURE SENSOR FOR ATTENDANCE MACHINE

By

Muhammad Rifki Hartanto
Dr. Rusman Rusyadi

SWISS GERMAN UNIVERSITY

Technology is growing in unpredictable ways and taking over daily tasks that require human action. This project started because of a pandemic situation from the COVID 19 virus and the government rules to check every person's health to anticipate the virus is impacting other people. This project will use yolov4, anaconda, python, and OpenCV to check if some individual did not use a mask or if the person has a body temperature above 37 degree Celsius. This thesis will involve simulation to analyse whether a smart system can be used against the COVID-19 pandemic.

Keywords: YOLO, open cv, Mask recognition, Covid 19, Darknet.



SWISS GERMAN UNIVERSITY

DEDICATION

I dedicate this works for my future self who is smiling without stress, family, mentor, friends and my alma mater.



ACKNOWLEDGEMENTS

This is the part where you express your gratitude to all parties involved in the success of your thesis work. However, keep it simple and short.

I wish to thank, from the bottom of my heart my family who supported me to this point in life, the patience and trust of my mentor, Mr. Rusman. who pushed me to new heights and provided the mental support in guiding me to accomplish the thesis. Thank you, dearest friends, for being the backbone to survive and enjoy 4 years of university life. As I reach the end of this thesis, I reminisce about the benefits and how much I have grown in the past 6 years. Not only did enrolling in mechatronics taught me the basics of being an engineer, but it also provided me with the mindset and tools beneficial for my upcoming endeavours that are yet to be explored.



SWISS GERMAN UNIVERSITY

TABLE OF CONTENTS

	Page
STATEMENT BY THE AUTHOR.....	2
ABSTRACT.....	3
DEDICATION.....	5
ACKNOWLEDGEMENTS.....	6
TABLE OF CONTENTS.....	7
LIST OF FIGURES.....	9
LIST OF TABLES.....	10
CHAPTER 1 – INTRODUCTION.....	11
1.1 Background.....	11
1.2 Objective.....	11
1.3 Hypothesis.....	12
1.4 Research Problems.....	12
1.5 Research Scope.....	12
1.6 Research Limitations.....	13
1.7 Significance Study.....	13
1.8 Research Questions.....	13
1.9 Thesis Structure.....	14
CHAPTER 2 - LITERATURE REVIEW.....	15
2.1 Computer Vision.....	15
2.2 Computer Vision.....	16
2.3 Facial Landmark and Object Detection.....	17
2.4 You Only Look Once (YOLO).....	17
2.5 Inter Integrated Circuit (I2C).....	19
2.6 Arduino.....	19
CHAPTER 3 – RESEARCH METHODS.....	20
3.1 Hardware Design.....	20
3.2 Software Design.....	21
3.2.1 Arduino and Qt.....	21
3.2.2 YOLO.....	24
3.3 Electrical Design.....	26
3.3.1 Electrical Component.....	26

3.3.1.1	Arduino Uno	26
3.3.1.2	MLX90614 Thermal Sensor	28
3.3.1.3	Electrical Circuit	29
3.4	Analytical Method	30
3.4.1	Testing Mode	30
3.4.2	Reliability Test.....	30
CHAPTER 4 – RESULTS AND DISCUSSIONS.....		31
4.1	System Overview.....	31
4.2	System Demonstration.....	32
4.2.1	MLX90614 Data Into GUI	33
4.2.2	YOLO Algorithm for Mask Recognition	34
4.3	Reliability	35
4.3.1	MLX90614 Data Into GUI	35
4.3.2	YOLO programming for Mask Recognition with random image.	40
4.3.3	Face Mask Recognition with Different Mask.....	47
4.3.4	Face Mask Recognition with Different Face Poses.	48
4.3.5	Face Mask Recognition with Multiple Person.....	50
4.4	Data Analysis.....	51
CHAPTER 5 – CONCLUSIONS AND RECCOMENDATIONS.....		54
5.1	Conclusions	54
5.2	Recommendations	55
GLOSSARY		56
REFERENCES		57
APPENDIX.....		59
CURRICULUM VITAE.....		61

LIST OF FIGURES

Figures	Page
Graph AP and FPS for Yolo	18
Hardware project.....	20
Testing Code Qt for arduino uno vendor id and product id.....	22
reading data algorithm	22
workflow sensor data to the Qt GUI	23
warning message for arduino not connected.....	23
Yolo model.....	24
Insert picture slot algorithm	25
YOLO workflow	25
Arduino uno hardware	27
Arduino uno programming for the sensor.....	27
MLX90614 sensor.....	28
Electrical circuit	29
Actual image of the project.....	32
result image and sensor recognition.....	32
body temperature measurement	33
data temperature sensor.....	33
result no mask image.....	34
result mask image.....	34
digital thermometer	35
data table comparison.....	38
picture 1.....	42
picture 2.....	43
picture 3.....	43
picture 4.....	44
picture 5.....	44
picture 6.....	45
picture 7.....	45
picture 8.....	46
picture 9.....	46
picture 10.....	47
data masks not recognized.	48
data masks recognize.	48
data mask with different pose	49
data mask with different pose	50
data mask with multiple person all recognize	51
data mask with multiple person with 2 person not recognize	51

LIST OF TABLES

Table	Page
MLX90614 datasheet	29
Repeatable Test for mask recognition and the sensor GUI.....	35
data table comparison.....	36
data table comparison.....	37
data table comparison.....	38
data table comparison.....	39
data table comparison.....	40
data table time consumption	41
data table time consumption	48
data table time consumption	49
data table time consumption	51

SWISS GERMAN UNIVERSITY