

[SMART CCTV HOME CAMERA WITH FACE RECOGNITION]



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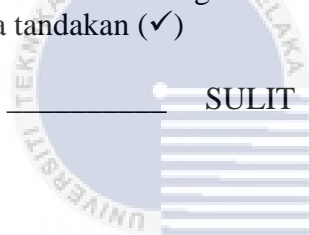
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SESI PENGAJIAN: [2020 / 2021]

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[SMART CCTV HOME CAMERA WITH FACE RECOGNITION]

[THENNARASU A/L PARAMASIVAN]



This report is submitted in partial fulfillment of the requirements for the Bachelor of [Computer Science (Computer Networking)] with Honours.


UNIVERSITI TEKNIKAL MALAYSIA MELAKA

FACULTY OF INFORMATION AND COMMUNICATION TECHNOLOGY
UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2021

DECLARATION


I hereby declare that this project report entitled
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is written by me and is my own effort and that no part has been plagiarized
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STUDENT :  _____ Date : 06/9/2021
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I hereby declare that I have read this project report and found
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SUPERVISOR :  _____ Date : 8/9/21
(PM DR MOHD FAIZAL ABDOLLAH)

DEDICATION

I would be so grateful because God still give me strength and passion to finish this project.

A special feeling to gratitude to my loving parents whose words of encouragement and push for tenacity ring in my ear.

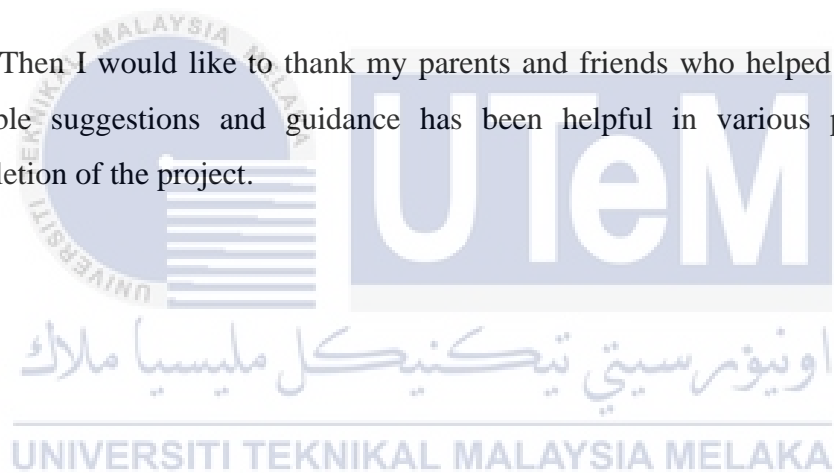


Last but not least, special thanks to my lovely and supportive, Pm Dr Mohd Faizal Abdollah. Thanks for all motivation, for being there for me throughout the entire Progress to complete this project.

ACKNOWLEDGEMENTS

Primarily I would thanks to God for being able to complete this project with success. Then I would like to thank my supervisor, Pm Dr Mohd Faizal Abdollah, whose valuable guidance has been ones that helped me patch this project and make it full proof success his suggestions and his instructions has served as the major contributor towards the completion of this project.

Then I would like to thank my parents and friends who helped me with their valuable suggestions and guidance has been helpful in various phases of the completion of the project.



ABSTRACT

Most of smart CCTV home camera that have face recognition are having problem in recognize people properly. The current algorithm technique that used in the face recognition could not recognize people properly if they are stranger or thieves at in front of the house door. This is very worrying if the CCTV could not recognize people. With the proper algorithm for face recognition, it can indirectly solve this problem. This cost for running this project is minimal and the beginner is also can easily build on his own. Devices like Raspberry Pi board, Raspberry Pi High quality camera and Raspberry Pi 6mm lens camera are the main devices for this project. Meanwhile, the system will send notification to the user if stranger or unknown people are detected. The system also easy to use which allow users to easily understand and use the face recognition camera. Finally, the users can use the proper algorithm for the CCTV camera and the camera can recognize people properly. By having this smart CCTV camera residents can avoid burglary problem getting worst among the residents.

ABSTRAK

Kebanyakan kamera rumah CCTV pintar yang mempunyai pengecaman wajah menghadapi masalah mengenali orang dengan betul. Teknik algoritma semasa yang digunakan dalam pengecaman wajah tidak dapat mengenali orang dengan betul jika mereka orang tidak dikenali atau pencuri di depan pintu rumah. Ini sangat membimbangkan jika CCTV tidak dapat mengenali orang. Dengan algoritma yang tepat untuk pengecaman wajah, secara tidak langsung ia dapat menyelesaikan masalah ini. Kos untuk menjalankan projek ini adalah minimum dan pemula juga dapat membina sendiri dengan mudah. Peranti seperti papan Raspberry Pi, kamera berkualiti tinggi Raspberry Pi dan kamera lensa Raspberry Pi 6mm adalah peranti utama untuk projek ini. Sementara itu, sistem akan menghantar pemberitahuan kepada pengguna sekiranya orang asing atau orang yang tidak dikenali dikesan. Sistem ini juga mudah digunakan yang membolehkan pengguna memahami dan menggunakan kamera pengenalan wajah dengan mudah. Akhirnya, pengguna dapat menggunakan algoritma yang tepat untuk kamera CCTV dan kamera dapat mengenali orang dengan betul. Dengan adanya kamera CCTV pintar ini, penghuni dapat mengelakkan masalah pencurian menjadi lebih teruk di kalangan penghuninya.

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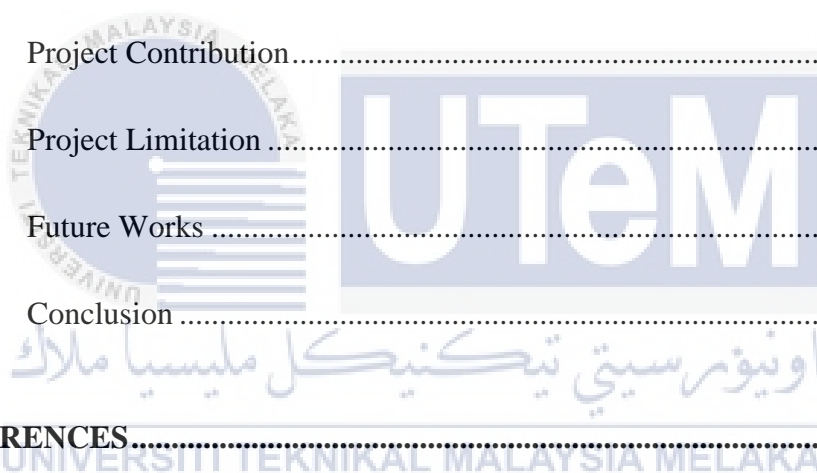
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LIST OF ABBREVIATIONS

FYP	-	Final Year Project
HOG	-	Histogram of Oriented Gradients
CNN	-	Convolutional Neural Network
SIFT	-	Scale-Invariant Feature Transform
LBP	-	Local Binary Patter
CCTV	-	Closed-circuit television
SMS	-	Short Message Service

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CHAPTER 1: INTRODUCTION

1.0 Introduction

Smart CCTV are becoming increasingly popular with the advances in both machine vision and semiconductor technology. Usually, CCTV was only able to capture images, while with the smart camera concept, a camera will have ability to generate specific information from the images that it has captured. We will address the context of the project which is applying face recognition in smart CCTV home camera. The research problem will be formulated into three research questions. Based on the research questions, the current problem that faced by users for the smart CCTV home camera will be clearly shown. After that, the research objective can be generated, and all works done in this project will be based on the research objective.

Firstly, project background will be discussed for the purpose of doing this project. The background of smart CCTV will be described. Secondly, the research problem will be summarized. After that the research question and objective will be conducted. Project scope and contribution will also be discussed. Lastly, the report organization will be described to make sure the project is carried out in correct flow.

1.1 Project Background

A smart camera, also known as an intelligent camera is a machine vision system that in addition to image capture circuitry that can collect specific informations. Usually smart CCTV camera implemented at the indoor or outdoor of the house to make sure the house is secure. Video monitoring for watching a specific area has

become a necessity in a world where everyone needs to keep their valuables safe and protected. To fix this problem, people use a smart surveillance device for location such as bank vaults and homes where human presence is not available. They continuously monitor the area with cameras. (Jain, A. Basantwani, S. Kazi, O. & Bang, Y, 2017).

People could not continuously monitor the camera for 24 hours because they have other real life things to do and they also get tired or might wasting their time on it. To avoid this thing, people came out with new solution called intruder detection with sensors. Intruder detection is in the protected zone that can be performed by physical protection that acts inside the objects perimeter. Intruder detections also can be done using active protection elements. One of the active protection elements is alarm systems and sensors. (Vel'as, A., Kutaj, M., & Ďurovec, M, 2017). They added motion sensor that connected to the smart camera, which will avoid people to monitor 24 hours.

The smart camera was redesign and implement at home security system with the capability for detect movements. The smart camera was implemented with PIR sensor that will detect the movement around the sensor that will activate the smart camera for capture pictures or record the surrounding situation. When the sensor detect suspicious object movement, the alarm also will go on to scare the intruder. (Nico Surantha, W. R, 2018). People also do not need to monitor the camera for 24 hours but the system still lack of few things in term of notify the owner of house when movement is detected at their house. The sensor also detect any movement include animals movement like cat and dog which will activate the smart camera and also the alarm.

The system was not efficient enough to secure the home. After that, the system have been embedded with notifier to notify user by using SMS-based. Once the sensor detect movement, it will sent SMS to the house owner. So the house owner can view the smart camera to make sure the surroundings are safe. (Nwalozie G. C1, A. A, 2015). Eventhought, the system have notifier but it keep notify any movement include animal movement. Therefore, the smart camera need to have face recognition which will be more efficient to detect people compare to the motion detector.

There is the camera with face recognition that have been created by the various group. They used different type of algorithm technique for the face recognition but there are still a few problems facing by face recognition in term of algorithm technique. Some people are harder to recognize by face recognition. However, there should be use the right face recognition algorithm to make a subject easier to recognize.

(J.R.Beveridge, 2018). Therefore, the smart camera need to have suitable face recognition algorithm technique thats more efficient to detect the people face.

1.2 Problem Statement

The residents require home security that needs to maintain the security of their house to avoid any intruders or thieves. Detecting intruders at the in front of the house door must be done by detecting their faces and notify the user, so the user will be alert on surrounding activities at the house. As such, the absence of such a system is a problem for residents. The Research Problem (RP) is summarized in Table 1.1.

Table 1.1 Summary of Problem Statement

No	Research Problem
RP1	The current algorithm technique that used in the face recognition could not recognize people properly if they are stranger or thieves at in front of the house door.

Thus, Research Questions (RQ) which are depicted in Table 1.2 is constructed to identify the research problem as discussed in the previous section.

Table 1.2 Summary of Research Question

No	Research Question
RQ1	What are the features for face detection that required for smart CCTV Home Camera?
RQ2	How are we going to detect and recognize people face using smart CCTV Home Camera?
RQ3	How to validate the result of the face recognition from the smart CCTV Home Camera?

RQ1: What are the features for face detection that required for smart CCTV Home Camera?

This research question is used to study about the face detection features for smart CCTV Home Camera.

RQ2: How are we going to detect and recognize people face using smart CCTV Home Camera?