CHAPTER I

INTRODUCTION

1.1.Background

This century marks the Fourth Industrial Revolution to take place. Machines no longer require human interferences for them to work. Machines need only to communicate with machines back-to-back for them to run certain tasks they are designed for [1]. Such are the brilliance of internet of things. An individual from the last revolution can only imagine such things, on the other hand we get to live in this century to be struck in awe with its' realness.

The rise of the fourth industrial revolution has set in motion the dire need of device-to-device communications and security. Since machine-to-machine communications are happening as we speak, new security systems or protocols among them are being developed. The problem however does not lie on the communications between the devices but on their abilities to differentiate between living beings, which means it is required to attain new discoveries on Biometrics. Biometrics focuses on automatic recognition of an individual using certain distinguishing traits [2]. As such facial recognition identifies as a branch of biometrics. Security systems have been applying artificial intelligence such as machine learning to train their systems, especially on facial recognition.

Following the COVID-19 pandemic, the need for non-physical security measures had risen which paved way for facial recognition to be further developed. This research aims to provide a better learning towards facial recognition system based on machine learning.

1.2. Aims and Objectives

This research aims to create an access system using facial recognition with the help of machine learning. The researcher will use the Raspberry Pi as a main component for the research to make an autonomous access system. The focus, however, will be on the software side since machine learning will be involved to

train the system to recognize different faces and allow access to individuals whose faces are recognized by the system.

1.3.Scope of the Research

This research will be limited to developing and training the machine learning model to recognize faces that are stored on the system. The research will also be limited to integrating the software to the hardware and allowing the hardware to detect a face it recognizes.

1.4.Research Method

The research method comprises of literature review of machine learning, face recognition, the Raspberry Pi, and the Python programming language. There are several sections that will be discussed. The first section will cover the logic behind the facial recognition machine learning such as the eigenfaces. The second section will discuss how machine learning will derive the distinct traits of faces from its training data. The final section will discuss how to integrate the trained model to the hardware to make the access system prototype.

1.5.Thesis Structure

The thesis will be divided into five chapters which are:

a) Chapter 1, which comprises of the background, aims and objectives, scope of the research, the research method, and the thesis structure. This chapter will elaborate the reasoning behind the research as well as its aims and focus.
b) Chapter 2 elaborates the basic theories of machine learning, face recognition, Python, and the Raspberry Pi that will be essential in the research.
c) Chapter 3 discusses the research methodology of designing access systems with facial recognition methods.

d) Chapter 4 discusses in detail the process of designing and training the machine learning model for facial recognition and to eventually integrate the model to the hardware.

e) Chapter 5 elaborates the data obtained and the analysis of the data.

f) Chapter 6 concludes the paper with several suggestions for this topic of research.