**KWAME NKRUMAH UNIVERSITY OF SCIENCE AND TECHNOLOGY,**

**KUMASI**

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**COLLEGE OF ENGINEERING**

**DEPARTMENT OF COMPUTER ENGINEERING**

DESIGN OF A FACIAL RECOGNITION PAYMENT SYSTEM

Project submitted in partial fulfilment for a Degree of Bachelor Science (BSc.) in Computer

Engineering.

By

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# DECLARATION

We hereby declare that except for specific references which have been properly acknowledged, this work is the result of our research and it has not been submitted in part or in whole for any other degree elsewhere.

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# ABSTRACT

The rapid rise of the internet brought with it many advancements and advantages. Communicating with people all around the world, research work, online banking and online shopping (transactions) are a few of the advancements that the internet has gifted us.

Each of these advancements are not without its disadvantages though, and in the field of online transactions a lot of fraudulent activities involving transactions have popped up over the years. A wide array of security methods has been put in place to curtail these activities but perpetrators have still found ways to bypass all these measures.

Standard measures such as four or six digit pins, alphanumeric passwords, retina scan and fingerprints have been implemented to secure online transactions. These features are good in their own respect but are not secure enough to prevent hackers and perpetrators from getting access to a user’s account and performing unauthorized transactions.

Take for example, a user who forgets her password often so decides to write it down on a piece of paper and stores it somewhere she feels is safe from prying eyes. In the eventuality of anyone stumbling across it, it becomes very easy to access her account and perform transactions without her knowledge. A user who also regularly loses her credit card could be a victim of such fraudulent transactions.

This calls for a better and efficient method of keeping one’s account, personal information and transactions safe from attackers. We therefore decided through extensive research that the best way to do this would be through implementing a front-view facial recognition system as the security method to perform online transactions.

This project is therefore aimed at developing a facial recognition system which is the most efficient and suitable biometric technology to secure payments, transactions and also address the aforementioned challenges and disadvantages of the other security measures. With the facial recognition system users will feel safe, secure and have the peace of mind knowing that no one has access to their accounts and their online transactions can be handled with speed, convenience, precision and security.

# DEDICATION

We dedicate this project to our supervisor, Ing. Dr. Eliel Keelson, for the aid, training and knowledge imparted to us during our stay in this noble institution and for the efforts contributed towards the completion of this project. May God richly bless him and grant him with more wisdom and insight.

# ACKNOWLEDGEMENT

Without God this project will not have been possible, we therefore acknowledge His grace that was assured us from the commencement to the final phase of this project.

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Table of Contents

[DECLARATION 3](#_Toc28363072)

[ABSTRACT 4](#_Toc28363073)

[DEDICATION 5](#_Toc28363074)

[ACKNOWLEDGEMENT 6](#_Toc28363075)

[LIST OF FIGURES 8](#_Toc28363076)

[LIST OF TABLES 9](#_Toc28363077)

[LIST OF ABBREVIATIONS 10](#_Toc28363078)

[1 CHAPTER ONE: INTRODUCTION 11](#_Toc28363079)

[1.1 BACKGROUND OF THE STUDY 11](#_Toc28363080)

[1.2 PROBLEM STATEMENT 13](#_Toc28363081)

# LIST OF FIGURES

# LIST OF TABLES

# LIST OF ABBREVIATIONS

# 1 CHAPTER ONE: INTRODUCTION

### 1.1 BACKGROUND OF THE STUDY

A facial recognition system is one that has the capability of identifying or verifying the identity of a person using their face. It captures, analyzes and compare patterns based on the person’s facial details [1].

Ecommerce, also known as electronic commerce or internet commerce, refers to the buying and selling of goods and services using the internet, and transfer of money and data to execute these transactions. Ecommerce is often used to refer to the sale of physical products online, but it can also describe any kind of transaction that is facilitated through the internet [2].

Most people confuse e-business with ecommerce but the clear distinction is in e-business referring to all aspects of operating an online business, ecommerce refers specifically to the transaction of goods and services [2].

Considering the aspect of facial recognition, humans have been able to identify and differentiate between familiar faces and that of strangers for centuries. In recent years humans have applied that ability to technology and implemented it in artificial intelligence creating applications that use facial recognition. The easiest explanation of this technology is that it uses a “camera to pinpoint facial features and create a map of the person’s face. The data gathered can then be analyzed against prerecorded facial images in a database to identify the person in question” [3].

This technology could use various distinct features such as the length between the pupils, the breadth of the nose and the distance between two points on the jawline. The software has evolved to the point where it can perform this under two seconds [4].

The main question is how did we get to this point? The origin of facial recognition can be traced back to the first camera that was invented. The pioneer of facial recognition can be traced back to Woodrow Wilson Bledsoe who was invested in the field of artificial intelligence and pattern recognition technology. Along with his team he undertook projects in Palo Alto, California in the mid-1960s [5].

He along with team created a device that used a stylus and a tablet to physically record facial features. The results of his innovation and study brought about the creation of Eigenfaces. Eigenfaces are in simple terms 2D facial structures generated by using algebraic methods. This was the prime breakthroughs in computerized facial recognition [6].

Considering ecommerce, its applications are endless. It could be used for a myriad of activities in almost all facets of the internet. Some of its uses relate to the banking, educational, publishing, retailing and marketing. Our main focus is on the retail side of ecommerce. The world has quickly adjusted itself to the advantages the internet provides and has guided itself into utilizing the retailing aspect of ecommerce.

The ease of use is one of the main reasons the current generation of internet users have bought into this idea. With a simple click of a button you could purchase any item at any location in the world and have it delivered to your doorstep. The comfort associated with this is what has pulled many users to patronize these services.

Back to facial recognition, which is our primary motivation for the security of ecommerce transactions. We are met with the methods involved in procuring the faces. Most of these methods could be summed up into a simple algorithm involving two steps. Feature extraction is the initial step that is taken with the next being classification of objects [7].

Many algorithms have materialized making facial recognition easier and faster. These algorithms could be divided into two primary factions, the first being geometric which basically picks out distinguishing features and photometric which is also a statistical approach that extracts the image and condenses it into values and juxtaposes them with a variety of models to eliminate discrepancies.

Other algorithms that have also cropped up in recent times are the gradient: which replaces every pixel representation of how bright that pixel is compared to those around it making it easier to recognize the same face regardless of lighting conditions and projection: which takes a 2D image and casts it around a 3D object preferably a cylinder. This method is able to bring out special features that were difficult to notice [8].

With regards to ecommerce it will afford users the opportunity to simply pay using their face with a camera pointed at it. This will curb most of the problems associated with forgetting passwords and mixing them up with other password used to log in to other applications. Where problems have arisen with customers’ PINs and card numbers being divulged, the facial recognition technology is essential in adding an extra layer of security. Fraud involving users having their account wiped out via fraudsters using the money to purchase items online will also be limited. Users could be rest assured that without their face present, transactions and data pertaining to their account will be safe and protected.

### 1.2 PROBLEM STATEMENT