BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

FINAL YEAR PROJECT REPORT

TITLE: AN AUTOMATIC EGG QUALITY SORTING SYSTEM

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A project report submitted to the department of computer engineering in partial fulfillment of the requirements for the award of a bachelor of Computer Engineering Degree of Busitema University

MAY, 2019

DECLARATION

I, **MUGUMYA ISAAC**, a student of Busitema University does hereby declare that this project report is of my original work and has never been presented for any academic accolade.

Signature: ..... Date: 30/05/2019.....

Bachelors in Computer Engineering

Department of Computer Engineering

Busitema University.

APPROVAL

This is to certify that the project titled "Automatic egg quality sorting system" has been done under my supervision and now ready for examination.

Signature: ..... Date: 30/05/2018

Dr. SEMWOGERERE TWAIBU

ACKNOWLEDGEMENT

Sincere appreciation goes to my family members especially my wife Mrs. Nakintu Diana for the great support from all corners during the pursuit of this course, my aunt Mrs. Kashemeire Rosette, friends and relatives who wish to see me a successful man. Furthermore, I thank my project supervisor DR SEMWOGERERE TWAIBU and entire staff of the Department of Computer Engineering Busitema University for the knowledge, guidance and support during the preparation of this report. May the almighty GOD bless you exceedingly!

DEDICATION

I dedicate this project report to my lovely son Mugumya Jasper Musinguzi.

LIST OF ACRONYMS AND ABBREVIATIONS

LDR Light Dependent Resistor

GUI Graphical User Interface

CNN Convolution Neural Networks

ABSTRACT

Poultry farming being one of the most lucrative businesses in Uganda has attracted many farmers to join for commercial purposes which has led to egg production on a larger scale. This calls for a way to grade eggs to remove those that do not meet the market standards especially the ones with defects on the shells. The automatic egg sorting machine that uses image processing has been developed to automatically detect and isolate the eggs with cracked egg shells providing more efficiency, reduced costs and reliability compared to the traditional candling methods of candling and observation that employ more human labor which comes along with the related drawbacks. The system consists of a camera connected to a computer with a sorting algorithm built in MATLAB which is interfaced with the Arduino mega 2560 board on to which two servo motors are connected via the adafruit motorshield that control the movement of the eggs during the sorting process.

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CHAPTER 1: INTRODUCTION

This chapter contains the background, problem statement, objectives, justification and scope.

1.1 Background

Poultry farming is one of the most lucrative businesses in Uganda and the world at large. The increasing demand for chicken (call it chicken meat) and eggs resulting from the growing population and townships across the country provides an opportunity for new and existing farmers to cash in on this enterprise[1]. However, the total eggs laid on a farm by the different birds also possess variations in size, color, weight and texture which brings variations in quality standards.

Today, quality of the egg is important from several standpoints which can make it acceptable or rejected by the consumer. The quality of eggs depends on physical make up and chemical composition of its constituent parts. Due to the diversity in the potential uses of poultry eggs and the subsequent consumer demands that egg quality become extremely difficult to define. Egg quality is the more important price contributing factor in table and hatching eggs. It is obvious that quality of egg is important from producer's point of view. One of the biggest challenges for the poultry industry is to provide consistent quality egg products to the consumer. Thus, breeding companies are shifting selection emphasis to improved egg quality. Problems associated with egg

quality include: egg shell defect and internal defects which can be broadly categorized into three groups namely: defects affecting yolk quality, defects affecting albumin quality and defects affecting overall quality. Egg quality defects are usually easily resolved, but can be costly if they are not dealt with quickly[2].

Most egg farmers in our country still employ manual means of naked eye observation or candling for sorting their eggs especially by small scale egg farm laborers. These methods of sorting require handling of eggs with care to avoid more cracking or breaking of the eggs. Errors in readings related to operator fatigue and judgment increase since they all depend on the observer. Moreover, the manual method becomes costlier and more impractical especially when dealing with larger number of table egg products. In addition, handling egg with bare hands introduces moisture to the egg's surface which may provide a suitable breeding ground for bacteria. Prolonged contact by humans to fresh eggs poses risk of possible contamination of Salmonella enteritis which are mostly present on the egg's surface as they pass through the cloaca of chickens[3]. Farm personnel especially those from backyard farms are often the victims of such contamination due to lack of proper hygienic procedures. Increased contact with human hands exposes eggs to cumulative fatigue due to manual collection, sorting and packing which also raises the chance of acquiring cracks on the shell. Internal contamination after penetration of Salmonella from the surface may occur. Such occurrence poses risks to the consuming public, especially with the increased desire of the consumers for raw and unprocessed eggs, potential risk of salmonellosis categories. The manual egg quality determination methods are only concerned with the external factors like dirt, color and major cracks leaving minor cracks unattended to.

This project has concentrated on sorting eggs by removal of those with cracked eggshells. Some tests like sniff test, visual inspection, floating test, candling is done to check whether eggs are of

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