BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING
DEPARTMENT OF COMPUTER ENGINEERING
BACHELOR OF COMPUTER ENGINEERING
FINAL YEAR PROJECT REPORT

IRISH POTATO QUALITY MONITORING AND CONTROL SYSTEM

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A final year project report submitted in partial fulfillment of the requirements for the award of a Bachelor's Degree in Computer Engineering of Busitema University.

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DECLARATION

I, **NAKALYANGO MOLLY,** do hereby declare that this project is my original work and has not been submitted for any other degree award to any other University before.

Signature ..... Date 9th/02/2021

APPROVAL

This is to certify that the project proposal under the title "**Irish Potato quality monitoring and control system**" has been done under my supervision and is now ready for examination.

MR. BWIRE FELIX

Department of Computer Engineering

Signature ..... Date: 9/02/2024

ACKNOWLEGEMENT

I give glory to God and the Holy Spirit for the great help and guidance throughout this project.

My Supervisor, Mr. Bwire Felix who has continuously guided me throughout this project.

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Finally , I extend my great thanks towards my classmates and the BCT department plus my friends for the great ideas extended towards the completion of this project.

DEDICATION

I dedicate this report to my supervisor, Mr. Bwire Felix, my beloved family, class mates. Your contribution to my education has been wonderful, encouraging and promising a bright future in my life.

ABSTRACT

Irish potato freshness level is an important factor to determine the quality of Irish potatoes for consumption. This system has been designed to automatically detect changes in the storage conditions in a very fast and nondestructive way.

In traditional storage systems, storage owners have to visit the storage system regularly to measure the various environmental parameters such as temperature, humidity and carbo dioxide concentration to ensure maintenance of good quality Irish potatoes. Even though these traditional storage methods have been used for years, the methods are hectic and fail to maintain the environment parameters for the storage methods accurately in real time. In contrast, a storage system stores crops where environmental parameters are adjusted based on crops types.

Irish potato quality monitoring and control system was developed to give ease in terms of monitoring environment parameters in the storage system that reduce the quality of stored Irish potatoes. The system is capable of monitoring and controlling the relative humidity

The system is implemented onto an Arduino microcontroller equipped with a humidity, temperature, carbon dioxide sensors as the monitoring and control tools to replace the human interaction to manually keep track of the suitable storage conditions. The system is also equipped with two selection buttons to enable multi functioning of the different storage purposes.

The selection made by the user activates the sensors that read values to activate the monitoring and control of the suitable conditions that support the storage in relation the purpose selected by the user.

The system's inputs are the humidity and temperature sensed by the gas sensor that is DHT22 sensor, the MQ-5 sensor for carbon dioxide concentration and the selected input purpose where the status of the components is displayed on the LCD.

The system has a high percentage of success but the small errors are due to the incremental in the gas sensor reading since the sensors are very sensitive to environmental changes. Thus, it may be concluded that the system is successful to automatically monitor and control the quality of the stored Irish potatoes and the implementation of this system is expected to replace the traditional methods used for storage.

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LIST OF ACRONYMS

LCD	Liquid Crystal Display
RH	Relative Humidity
FAO	Food and Agricultural Organization
LDR	Light Dependent Resistor
MOA	Ministry of Agriculture
GPRS	General Packet Radio Service
CO_2	Carbon dioxide
O_2	Oxygen
Gas	Glycoalkaloids
BW	Bacteria Wilt
LB	Late Blight
AHI	Africa Highland Initiation
SWARP	South Western Uganda Agricultural Rehabilitation Project

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CHAPTER ONE: INTRODUCTION

This chapter includes the background, problem statement, objectives, justification and the scope of the study.

1.1 BACKGROUND

Irish Potato (Solanum tuberosum L.) is grown and eaten in greater countries more than some other crops. It is a crop that grows mainly in climates with cool temperature, full sunlight, moderate daily temperatures and cool nights [1]. Globally, Irish Potato is now the world's third most important food crop in terms of human consumption in the world. It is grown in over 100 countries across the world mostly in China, India, Russia, Ukraine, USA, Germany, Bangladesh, Poland, France and Belarus highly with a production of approximately 373.83 million metric tons a year[2]. Irish Potato production in Africa is dominated by four countries, Egypt, Algeria South Africa, and Morocco, which produce approximately 65% of the crop[3].

Nationally, it's one of the main food crops grown in Uganda in addition to bananas, sweet potatoes, cassava, maize, beans and groundnuts with the major Irish Potato producing districts as Kabale, Kisoro, Rukungiri, Mbarara, Kasese, Kabarole, Masaka, Mubende, Mbale, Kapchorwa and Nebbi [4]. According to MOA and FAO figures, Uganda produces approximately 450,000 tons of Irish Potatoes from 65,000 hectares with an average yield of 7 tons per hectare [3]. These Irish Potatoes are of different types which include: Victoria, Kisoro, Kabale, Rutuku and NAKPoT (1, 2, 3, 4, 5) [5]. Rutuku (a local variety) and Victoria are the main varieties cultivated. Victoria type is particularly suitable for chips while Ugandan Rutuku is for crisps.

Of the total Irish potato production in Uganda, 10 per cent is used as seed, 10 per cent is wasted and 80 per cent is consumed inside the country. The potential demand for seed potatoes in Uganda is estimated at 239,328 tones and seed availability is only 0.13% of potential demand.

In Uganda, 55% of farmers select and store small tubers from their own production to plant the next season while about 4% of others acquire seeds trained farmers associations, seed growers and national research stations for growing.

The Irish Potato production cycle includes proper storage as a crucial part for the supply of high quality and fresh Irish Potatoes to consumers [4]. Irish Potatoes should be stored with proper

6.5 REFERENCES

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