FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

A WEB-BASED CEREAL STORAGE MONITORING SYSTEM

BY

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DECLARATION

I Nabawesi Lilian Reg.No BU/UG/2015/29 hereby declare that this project report is my original work except where explicit citations have been made and it has not been presented to any Institution of higher learning for any academic award.

Sign: .....

Date: 30th/05/2019....

APPROVAL

This is to certify that the project report under the title "A Web-Based cereal storage monitoring system" has been done under my supervision and is now ready for examination.

Dr. Semwogerere Twaibu

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Sign: .....

Date: 25/01/2019

DEDICATION

I dedicate this report to my beloved parents Mr. SERUGO JOHN and Ms. NAMUGWERE JALIA.

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I thank the almighty God for life and knowledge that helped me through this project.

Appreciation is rendered to my parents for your contribution to my education which has been wonderful, encouraging and promising a bright future in my life. They have always been there for me even when the going seemed toughest, I love you all and may the almighty God reward you with unfathomable blessings, Glory be to God Almighty.

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LIST OF ABBREVIATIONS

IDE	Integrated Development Environment
GUI	Graphical User Interface
LCD	Light Emitting Diode
GSM	Global System For Mobile Communication
DC	Direct Current
MySQL	My Structured Query Language

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ABSTRACT

In Uganda, as well as other developing countries, the major food crops such as cereal grains are normally seasonal crops. Therefore, the food produced in one harvest period must be stored for gradual consumption until the next harvest.

Hermetic (i.e. airtight) storage systems have been developed but they have drawbacks such as insects' infestation and limited capacity. The absence of storage monitoring technologies often force the smallholders to sell their produce immediately after harvest to avoid post-harvest losses from storage pests and pathogens.

The main objective of this project was to design and develop a web-based storage monitoring system for maize cereals that tracks and regulates selected parameters necessary for conducive storage (i.e. temperature, moisture content and relative humidity), since it is observed that hermetic storage method is more reliable and efficient compared to traditional storage practices in developing countries that cannot guarantee protection against major storage pests of staple food crops like maize. Hence, hermetic storage method has been used in this developed system. The developed system is able to automatically take the values of these parameters in real time and they are sent to a web application that is easily stored and interpreted for further analysis.

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CHAPTER ONE: INTRODUCTION.

1.1 Background

Seeds are key to development. They are first and foremost the source of all food and agricultural production. Seeds are genetic resources and carry plant genetic diversity. Seed storage systems serve as a means to attain food and nutrition security, income generation and the preservation of genetic heritage [1].

Africa is the center of origin and still today the major producing area for several cereal crops, notably sorghum, maize, millet and African rice; these traditional African cereals are staple foods for millions of people in the semi-arid regions of the world, particularly in Africa and India, and especially particularly those who live by subsistence farming[2].

Maize is widely grown in Uganda covering about 50 districts. The crop is cultivated by over 3.6 million households on about 1.5 million hectares of land. In terms of area planted, maize is the third most cultivated crop after banana and beans. In some regions of the country, the crop has now become a staple food, replacing crops like sorghum, millet, cassava and banana. It is a growing source of household income and foreign exchange through exports. In 2008 alone, maize is estimated to have generated over US$ 18.5 million in export earnings from an estimated 66,700 tonnes[3].

Although in many parts of Uganda certain crops can be produced throughout the year, the major food crops such as maize are normally seasonal crops. Consequently, the maize produced in one harvest period, which may last for only a few weeks, must be stored for gradual consumption until the next harvest, and seed must be held for the next season's crop[4]. Home storage of seeds is still a useful, necessary practice, though we share with our ancestors one continuing problem, the presence of insect pests in stored food.

Traditional storage practices in developing countries cannot guarantee protection against major storage pests of staple food crops like maize[5]. According to the executive director of the grain council Uganda, Mr. Wilfred Tembo; Traders are losing 40% of what they would earn in international trade due to poor storage of produce. Uganda produces two million metric tonnes of maize annually, but only 550 metric tonnes are properly stored. In 2017, the World Food Programme cancelled $6m (about sh15b) worth of contracts with Ugandan grain traders because their produce did not meet the required standards[6].

In an effort to store grains for a longer time, hermetic (i.e. airtight) storage systems have been developed but they have drawbacks such as insects' infestation and limited capacity [7]. Prevention of pests is important as losses during storage reduce food availability, quality, and the stability of farmers' food supply and income. The lack of suitable storage structures for grain storage and absence of storage monitoring technologies often force the smallholders to sell their produce immediately after harvest.

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