BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

A BEEHIVE INTRUSION AND HONEY MOBITORING SYSTEM

BY

KYAMPEIRE HADIJAH

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DECLARATION

I, KYAMPEIRE HADIJAH BU/UG/2013/42 do hereby declare that this project report is original and has not been submitted for any other degree award to any university before.

Signature: ……………………. Date……………………….

APPROVAL

This Project Report has been submitted with the approval of the following supervisor.

Signature ……………………….   Date: ………………

MR. ALUNYU ANDREW EGWAR

Department of Computer Engineering

Faculty of Engineering

Busitema University

DEDICATION

I dedicate this project report to my beloved parents Mr Ismail Omega and Mrs Kanifa Omega for the love and support they have provided to me throughout this project period, my sisters Kemigisha Mariam and Kyasimire Safina for the advice and financial support they rendered to me during the research period.

I also dedicate it to my project supervisor Mr. Alunyu Andrew Egwar for his tremendous effort and guidance in relation to my project report , the courage, and the moral & support he offered to me during my research period MAY the almighty ALLAH BLESS him.

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LIST OF ABBREVIATIONS

GSM   Global System for Mobile Communication

LCD   Liquid Crystal Display

PCB   Printed Circuit Board

SMS   Short Message Service

WSN   Wireless Sensor Network

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ABSTRACT

A beehive is a wooden structure that is designed special for bees to stay in as they multiply and produce their products. In Uganda, beekeeping is increasing due to its great benefits in terms of its products namely honey and wax and it being highly profitable which increases the country's economy as compared to other Agricultural practices like poultry keeping among others. However, beekeeping is normally done some distance from the homesteads due to the bee behaviors, therefore if not monitored regularly it can be of great loss to the farmers. The currently used beehives do not have an automated mechanism for monitoring honey and detecting intrusion. This has led to decrease in the country's economy and losses to the bee farmers. In this system, the weight sensor is used to detect increase in the weight of honey combs then the system reports beehive full and the LDR is for detecting change in light intensity then report intrusion. A GSM modem is used to notify the user about the honey accumulation and intrusion at the hive so that the necessary actions are taken to avoid losses. This system will reduce the increasing losses in Agriculture mainly from the beekeeping sector.

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CHAPTER ONE
INTRODUCTION

1.1 Background of study

Beekeeping is one of the oldest branches of agriculture which includes the collection and care of the bee swarms, pollination of field crops by bees, the study of bee products and the breeding of the bees for large scale honey production [1]. It greatly contributes to the economy of a country due to the highly priced products like honey and wax [2]. The government of Uganda, through the plan for modernization of agriculture, is promoting beekeeping extension services particularly among the rural poor. This program has assisted poor farmers to invest in beekeeping through group organizations [3].

Beekeeping in Uganda has continued to be traditionally based with production and currently there are three common methods of production used in Uganda [4];

Firstly, Honey hunting where honey is collected from wild colonies in trees, caves, etc. This method has drastically diminished in the wake of the new / improved technologies.

Secondly, Traditional log hive method where traditional log hives made out of bamboo and logs are used and harvests are done at random using rudimentary methods. The majority of the original traditional beekeepers in Uganda still use log hives. These hives require replacement every 2 years.

Thirdly, Traditional improved hives, called the "Top-bar hives". These were developed as man struggled to domesticate bees commercially.

However, the above methods due to their associated challenges of one time harvest, regular replacement and poor technology for monitoring the right time for maximal harvest the above methods have not been efficient as bee farming has been observed declining which has not only posed a great threat to the world's economy but also the agricultural produce [5]. This decline has been as a result of many factors including lack of knowledge about the availability of honey, intrusion, diseases, parasites, pesticides, the environment, and socio-economic factors [6]. The challenge of lacking knowledge about when to harvest and what to harvest has greatly affected the quality of honey collected thus reduction in the economy [7], also it results into the bees eating all

the honey in case the weather is cold, or even intruders/ thieves come and steal the honey. Also our local Ugandan beekeepers currently use their local knowledge and predictions on telling when honey has accumulated, for example they estimate an interval of three months from the previous harvest, observing the bees being too hostile and protective of their hive and also the blackness of the beehive entry holes. This makes it inefficient and time consuming incase the beehives are far from home, and also for the blackness of the entry holes if it's for the second and above times it will always be black and hence one wont base on such observations for long.

Therefore there is need for a system that will help in monitoring honey production and accumulation in the beehive and prevent the other associated problems.

1.2 Problem statement

In the light of increasing number of bee colonies in the world, the key issue in question is the Safety and production knowledge associated to the bee hives and colonies. Protecting the population of honey bees worldwide, as well as enabling them to maximize their productivity, is an important concern. Due to lack of technological knowledge about honey harvesting, traditional bee farmers do not hesitate to grab whatever they find in the hive during the flow season even before the honey ripens which has resulted into poor quality honey [8]. Therefore if this challenge persists it might result into much decline in the country's economy as well as agricultural produces. Existing beehive monitoring methods are not so reliable as regards Safety and detection of honey for harvest because they mostly focus on the health of the bee, this project work sought to monitor the beehives for honey accumulation and intrusion occurrences.

1.3 Objectives

The objectives of this study are divided into two parts that is main objective and specific objectives.

1.3.1 Main objective

To Design and develop a beehive intrusion and honey monitoring system to improve the bee farming sector.

1.3.2 Specific objectives

1. To study and review literature related to the current beehive management and monitoring systems in order to identify system requirements.
2. To design a beehive intrusion and honey monitoring system.
3. To develop a system that assists bee farmers to wirelessly monitor their bee hives and colonies system.
4. To test and validate the beehive intrusion and honey monitoring system.

1.4 Justification

Bee farming is among the major agricultural sectors that contribute much to the world's economy through the bee products like honey and the existence of beehives is a critical predictor of the planet's future health and agricultural sustainability. Bee farmers are constantly facing a challenge of monitoring honey in the beehive which has resulted to poor quality produce or even no produce thus monitoring beehives is required in order to ensure good quality honey which will increase income or even be used as medicine.

1.5 Scope

1.5.1 Technical scope

The beehive intrusion and honey monitoring system has a sensor that takes the weight measurements of the honey combs full of honey, another sensor that detects intrusion inside the beehive. An alert message is sent by the system to the user's mobile by use of the GSM module in reaction to the occurrence of the above two conditions. However it does not directly harvest honey and neither does it catch the thief.

1.5.2 Geographical scope

The System has been developed to help the traditional bee farmers in Uganda and other places where apiculture is practiced. It will be most applicable in the modern bee hives leaving out the wild bee hives and colonies which are just made by bees themselves in an open place.

1.5.3 Time scope

Development of the system took me about six months.

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