BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

A Web based Solar Drying Monitoring System

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DECLARATION

I MUGUYA Bashir Reg.No BU-UG-2014-27 hereby declare that this project Report is my original work except where explicit citation has been made and it has not been presented to any Institution of higher learning for any academic award

Sign: .....

Date: 06/06/2018.....

Approval

This is to certify that the project Report under the title ***"A Web Based Solar Drying Monitoring System"*** has been done under my supervision and is now ready for examination.

Mr. MATOVU Davis

Department of Computer Engineering

Sign: .....

Date: 05/06/18

List of Abbreviations

GSM	Global System for Mobile Communication
IFPRI	International Food Policy Research Institute
IP	Internet Protocol
RJ45	Registered Jack
HTTP	Hyper Text Transfer Protocol
WAMP	Windows Apache MySQL and PHP
LAN	Local Area Network

ABSTRACT

General overview of subject matter

One most time-consuming activity is monitoring drying of most of the important Agricultural products, drying using solar is a renewable and environmentally friendly technology, it has been considered as an advancement of natural sun drying and it is a more efficient technique of utilizing solar energy. Most of the agricultural products are seasonal crops and get spoilt quickly due to failure to achieve moisture contents that are required for proper storage. To make their usage efficient, they can be dried to a moisture content required and preserved so that they can be maintained over a long period. The natural drying process has many drawbacks, such as requiring more time, large investment on space requirement and infrastructure for drying process and failure to achieve desired moisture contents which cannot be afforded by a middle-class farmer. The financial up gradation of a farmer, export firms and subsidiary farmers in developed countries is possible by providing the modern techniques that help; automate, enable user definition of the temperature and moisture content needed to be achieved at low cost units. A web based solar drying monitoring project described a controlled environment which was suitable for the drying process within a closed chamber using a microcontroller and monitoring of the process over the web interface. To start with, the sun rays were used to internally heat the products to remove the water content within. Then the air was blown inside the chamber to maintain the humidity below a specified level using the exhaust fan.

Microcontroller was used to control the functions of heating, blowing the air, controlling the speed of exhaust fan and giving time indication & maintain constant temperature throughout the chamber, the ethernet shield caused the system (solar drying chamber) to act as a client that keeps pushing readings from the temperature/moisture sensor to the database over to the machine where WAMP was installed and where the web can be accessed using a router which created a LAN for the network. After the completion of the drying process a buzzer was activated for a certain duration of seconds to indicate the end of the drying process and achieved moisture content. A text message was sent to the farmer through GSM to intimate him if he is not around. For users over the web interface, a notification was sent to show that moisture content has been achieved. The graphical analysis of temperature and moisture against the timestamp show how the parameters keep changing over the days and nights during the drying process.

Brief findings and conclusions

The temperature to be maintained within the chamber depends on the initial contents of the agricultural product and the effect of temperature on the contents. The temperature and moisture content are dependent on the user requirement. Humidity gradient to remove the water content in the products was varied by varying the fan speed. It was thus observed that the temperature gradient plays an important role in the initial period of the drying phase and the Humidity gradient plays an important role in the later part of the drying phase to retain the original flavor of the product and to avoid caramelization.

The system can be made more economical by making a provision for drying variety of products in multiple units. This arrangement can be made possible by using sensor networks for various solar chamber dryers. To make it economically viable for farmers, an application specific integrated circuit by embedding the digital circuit into chips can be produced on a large scale. Here remote monitoring of the dryers over the web interface can be done and notifications sent as per each dryer.

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CHAPTER ONE

1.0 Introduction

This chapter comprises of the background, problem statement, justification and Objective of study

1.1 Background

One regular task where human beings spend most of the considerable amount time is monitoring the food processing and storage process of the basic agricultural products. According to a study conducted by IFPRI (International Food Policy Research Institute) indicated that African women undertake about 80 percent of the work in food storage, 60 percent of the work in harvesting and marketing[1]. Furthermore, An earlier study in Cameroon also revealed that women significantly spend more time on agricultural tasks: they spend 348 minutes on production of food crops while men spend 270 minutes a day on foods and export crop production[2]. In view of some of these tasks, crop drying has been identified as one of those tasks that demand much attention from farmers for better outputs, several methods and modes of drying have been employed but Solar drying being a renewable and environmentally friendly technology in the field of agriculture where people spend much of their considerable time in carrying out farm activities for example drying, storage and marketing, it has been considered an advancement for natural sun drying as it is a more efficient technique of utilizing solar energy. It is one of the methods used to preserve agricultural products for longer periods. The heat from the sun coupled with the wind has been used to dry agricultural products for preservation over a number of years. Open-air sun drying uses solar radiation to directly heat the material. The product is spread out on large outdoor surfaces on the ground or on trays and left there to dry until the desired moisture content is achieved. Regularly the material is turned over to expose different sides and increase the drying efficiency. Drying is the oldest preservation technique of agricultural products and it is an energy intensive process. High shortages of fossil fuels have increased the emphasis on using alternative renewable resources [3]. Drying of agricultural products using renewable energy such as solar dryers have been designed developed and tested in the different regions of Uganda but they have a number of drawbacks, such as requiring more time during the process of monitoring the required parameters (temperature, humidity and the moisture content), use of rudimentary methods, over drying or under drying and failure to determine the required moisture content which is always inconveniencing and limits other human activities on large scale farms. Solar thermal technology

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