



**BUSITEMA  
UNIVERSITY**  
*Pursuing Excellence*

**FACULTY OF ENGINEERING**

**DEPARTMENT OF COMPUTER ENGINEERING**

**FINAL YEAR PROJECT REPORT**

**TITLE: A WIRELESS GREENHOUSE MONITORING AND CONTROLLING  
SYSTEM.**

**BY**

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**A Final Year Project Report Submitted to the Department of Computer Engineering in  
Partial Fulfillment of the Requirements for the Award of Bachelor of Science in Computer  
Engineering Degree of Busitema University**

**April 2019**

**DECLARATION**

I Abaho Daphine declare that this report is my original work and has never been submitted by any student to any institution of higher learning for an academic award

Sign .....Date .....

## **APPROVAL**

This Project Report under the title “A Wireless Greenhouse Monitoring and Controlling System” has been submitted with the approval of the following supervisor.

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## **ACKNOWLEDGEMENT**

I thank the almighty God for life and knowledge that he gave me through this project. I also appreciate my Supervisor Mr. Arineitwe Joshua for guidance and insight into concepts of research and project management as well as technical knowledge applicable in the design of the system.

I also thank DigBit Technologies for availing me with the components and some of the training that made my project a success.

## **ABSTRACT**

A greenhouse provides a stable and suitable environment for the growth of plants. However, extreme environmental factors inside the greenhouse such as high temperatures, high humidity, light intensity and carbon dioxide can negatively impact the plants. Consequently, controlling this environment is essential in order for the plants to grow strong and healthy. The aim of this project was to design and build a greenhouse controller that can maintain the environment, by acting upon live sensor readings and be able to display the status of the system to the owner. The project was split into two parts: programming a microcontroller to act as the central hub that manages the sensors and creating a mobile application to allow the user to interact with the greenhouse controller.

Green House Monitoring and Controlling is a complete system designed to monitor and control the humidity, temperature, light intensity, soil moisture and carbon dioxide inside a green house. This software uses an Android mobile phone, connected to a central server which connects via serial communication to a microcontroller and to the sensors and to the controlling devices. All farmers can control their greenhouses from a distance. They can know the status of their greenhouse climate (temperature, humidity, light intensity, soil moisture and carbon dioxide) and can control the Devices.

This system is simple in design, easy to install, monitors and controls the values of weather parameters without human interruption. This helps the farmers to achieve maximum plant growth and yield throughout the season.

## **LIST OF ACRONYMS**

ADC Analogue to digital converter

CO<sub>2</sub> Carbon dioxide

O<sub>2</sub> Oxygen

RH Relative humidity

IOT Internet of things

PPM Parts per million

IDE Integrated development environment

SQL Structured Query Language

PIC Programmable Interface Controllers

**TABLES OF CONTENTS**

DECLARATION ..... 0

APPROVAL ..... ii

ACKNOWLEDGEMENT ..... iii

ABSTRACT ..... iv

LIST OF ACRONYMS ..... v

TABLES OF CONTENTS ..... vi

LIST OF FIGURES ..... ix

LIST OF TABLES ..... x

CHAPTER ONE: INTRODUCTION..... 1

    1.1BACKGROUND..... 1

    1.2 PROBLEM STATEMENT ..... 2

    1.3PROJECT OBJECTIVES. .... 2

        1.3.1Main objective ..... 2

        1.3.2 specific objectives..... 2

    1.4 JUSTIFICATION..... 2

    1.5 SCOPE ..... 3

    1.6 CHALLENGES FACED IN IMPLEMENTING..... 3

CHAPTER TWO: LITERATURE REVIEW ..... 4

    2.1 TECHNICAL ANALYSIS IN GREENHOUSE..... 4

    2.2 CRITICAL EVALUATION OF THE WORKS IN GREENHOUSE. .... 4

    2.3 GAPS RECOMMENDED IN GREENHOUSE ..... 5

        2.3.1 Region selection on the basis of weather conditions and crop requirements[10]: ..... 5

    2. 4 MAIN CONCEPTS USED ..... 5

        2.4.1Microcontroller technology..... 5

        2.4.2 Greenhouses Monitoring and Control ..... 5

            2.4.3. Environmental Factors..... 6

        2.4.4 Environmental Factors and Possible Actions..... 7

        2.4.5 Ethernet Shield ..... 8

        2.4.6. Internet of things and Greenhouses..... 8

            2.4.6.1 The cloud computing:..... 8

2.4.6.2 IoT platform.....	9
2.5 CLASSIFICATION OF GREENHOUSES .....	9
2.6 EXISITING SYSTEMS .....	10
2.5 DESIGNED SYSTEM .....	12
CHAPTER THREE: METHODOLOGY .....	13
3.1 REQUIREMENTS GATHERING.....	13
3.2 REQUIREMENT ANALYSIS .....	13
3.3 SYSTEM DESIGN .....	14
3.3.1 Hardware tools/components include:.....	14
3.3.2 Software Tools: .....	14
3.4 TESTING .....	14
3.4.1 Unit testing .....	15
3.4.2 Integration testing.....	15
3.4.3 System testing.....	15
CHAPTER FOUR: SYSTEM ANALYSIS AND DESIGN.....	16
4.1 FUNCTIONAL ANALYSIS.....	16
4.2 REQUIREMENT ANALYSIS .....	16
4.2.1 Functional Requirements.....	16
4.2.2 Non-Functional Requirements.....	16
4.3 DATA FLOW MODEL OF GREENHOUSE SYSTEM.....	17
4.4 PHYSICAL DESIGN OF SYSTEM.....	18
4.5 HARDWARE DEVICES.....	18
<b>4.5.1 Arduino Uno Microcontroller.....</b>	<b>19</b>
4.5.2 Ethernet Shield.....	19
4.5.3 Temperature and humidity sensor .....	19
4.5.4 Soil moisture sensor .....	20
4.5.5 Carbon dioxide sensor.....	20
4.5.6 Light dependent resistor.....	20
4.6 MOBILE APPLICATION .....	21
4.6.1 Monitoring the Greenhouses .....	21
4.6.2 Remote Controlling the Greenhouse .....	21



4.7 THE CLOUD SIDE .....	21
4.7.1 Analysing and Storing Data .....	21
4.7.2 Remote Controlling .....	21
4.8 SCHEMATIC DIAGRAM OF MONITORING SYSTEM .....	22
4.9 DEVELOPMENT PLATFORMS .....	22
4.9.1 Arduino .....	22
4.9.2 Android Studio .....	22
4.9.3 PHP Storm .....	22
4.9.4 MySQL Workbench .....	23
4.9.5 CSS .....	23
4.9.6 JQuery .....	23
4.9.7 Bootstrap .....	23
4.9.8 MySQL .....	23
4.9.9 SQL .....	23
4.10 CODE DESIGN .....	24
CHAPTER FIVE: DISCUSSIONS AND RECOMMENDATIONS .....	25
5.1 SUMMARY OF WORK .....	25
5.2 CRITICAL ANALYSIS /APPRAISAL OF THE WORK .....	25
5.3 RECOMMENDATIONS .....	25
5.4 CONCLUSION .....	25
REFERENCES .....	26
APPENDICES .....	28
Appendix 1: Controlling System Codes .....	28
Appendix2: Interfacing system code .....	37
Appendix3: Control and monitoring center for a greenhouse .....	43

## LIST OF FIGURES

<b>Figure 2. 1: The structure of a greenhouse environment</b> .....	10
<b>Figure 4. 1: Flow chart of greenhouse system</b> .....	17
<b>Figure 4. 2: Physical design of system</b> .....	18
<b>Figure 4. 3: Arduino Uno Microcontroller</b> .....	19
<b>Figure 4. 4: Ethernet Shield</b> .....	19
<b>Figure 4. 5: Temperature and humidity sensor</b> .....	20
<b>Figure 4. 6: Soil moisture sensor</b> .....	20
<b>Figure 4. 7: Carbon dioxide sensor</b> .....	20
<b>Figure 4. 8: Light dependent resistor</b> .....	21
<b>Figure 4. 9: Schematic diagram of greenhouse monitoring system</b> .....	22

## LIST OF TABLE LIST OF TABLES

<b>Table2. 1:Environmental factors and possible actions .....</b>	<b>7</b>
<b>Table2. 2:Optimum parameter range for greenhouse crops .....</b>	<b>8</b>
<b>Table2. 3:The Summary of the Existing Systems .....</b>	<b>11</b>

## **CHAPTER ONE: INTRODUCTION**

### **1.1 BACKGROUND.**

Greenhouses are structures where plants are grown. They are often used for growing flowers, vegetables, fruits and other food crops and may be used at any season or year-round. The closed environment of a greenhouse has its own unique requirements compared with outdoor production. The greenhouses are very useful because they provide an optimal temperature around plants, protect them from weather extremes and extends the growing season. The rising demand for crop production and quality has significantly increased the utilization of high-quality greenhouses[1]. The increased population in Uganda demands for large amount of crop production and so we can cultivate the crops which need some specific environmental conditions in the greenhouse[2].

The problem in greenhouse climate control is that temperature changes occur rapidly and are depending on solar radiation, outside temperature, relative humidity and production systems[3]. The environment in a greenhouse is complex, dynamic and strongly influences crop cultivation. However, efficiency of plant production in greenhouses depends significantly on the adjustment of optimum climate conditions so that high yield and good quality can be achieved[3].

To achieve these goals several parameters such as air temperature, humidity, soil moisture, and carbon dioxide concentration must be controlled optimally by giving certain criteria through heating, water pumping, ventilation and carbon dioxide injection[4]. Continuous monitoring and controlling of these environmental factors give relevant information pertaining to the individual effects of the various factors towards obtaining maximum crop production.

More accurate control can reduce heating fuel and electrical costs, increase the productivity of workers by enabling them to attend to more than one valuable tasks, enabling managers and growers to make better management decisions than to spend more time managing the process[5]. More precise control of temperatures and humidity helps reduce plant stress and diseases and consequently improve grower information and management that are combined to increase the health and uniformity of plants [6].

Greenhouse monitoring and controlling system with fully integrated sensors sense the changing conditions and accordingly, synchronize the real time data to the cloud and this helps the farmer

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