BUSITEMA UNIVERSITY

FACULTY OF ENGINEERING

DEPARTMENT OF COMPUTER ENGINEERING

FINAL YEAR PROJECT

AUTOMATIC MONITORING AND CONTROL OF HYDROPONIC FODDER SYSTEM

BY

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May the almighty GOD bless you richly and exceedingly!

Thanks.

DECLARATION

I AMUKA ANDREW YOUNG, Registration Number BU/UP/2015/326, hereby declare that this project report is my original work except where explicit citation has been made and has not been submitted to any institution of higher learning for any academic award.

Signature: ..... Date: .....

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APPROVAL

The final year project entitled “Automatic monitoring and control of hydroponic fodder system.” has been done under my guidance and is now ready for examination.

Signature ……

Date ……..

Dr. SEMWOGERERE TWAIBU

Department of computer engineering.

DEDICATION

I dedicate this project report to my lovely mum Mrs. LAKER KERENI OGENA and my brother, Mr. OGENA FRANCIS, entire family members, relatives and friends.

I am very grateful for the support and endeavors you have done for me throughout my entire academic journey. May the Almighty richly reward you.

LIST OF ACRONYMS

GDP	Gross Domestic products
HFS	Hydroponic Fodder System
IOT	Internet of things
LCD	Liquid crystal Display
LED	Light Emitting Diode
Wi-Fi	Wireless Fidelity

ABSTRACT

Livestock contributes 40% of the global value of the agricultural inputs and in Uganda 52% of households which is approximately 21million Ugandans keeps livestock and its production is one of the major economic activities which contributes 5.25% and 12.7% to the total national GDP and the agricultural GDP respectively. However, the biggest challenge being faced in this sector is provide adequate quality green fodder for the livestock. Hydroponic fodder system has emerged as the solution to the green fodder shortage. Hydroponic fodder system is the growing of fodder or green grass without the use of soil. The farmers that have adopted to this new system have faced challenges with monitoring the environmental conditions like temperature, light and the moisture content in the system and this has led to slow growth of fodder and poor-quality fodder being produced. An automatic monitoring and control of hydroponic fodder system has been a project designed to help solve the monitoring problem in hydroponic fodder system.

This project consist of the temperature sensor which determines the temperature within the system, moisture sensor which help to measure the moisture within the system, water pump which is used to pump water in case the moisture content is low, the heating bulb this helps to generate heat in case the temperature is below the optimum, cooling fan use for cooling down the temperature to the optimal, lighting bulb which provides the light needed for proper growth of fodder and the microprocessor Atmega 328 which helps to control all the inputs and outputs of the system. The main goal of the project is to automatically monitor and control the environmental conditions like temperature, light and moisture content necessary for proper growth of fodder in the system.

The work is arranged mainly in six chapters, Chapter one includes the introduction to hydroponic fodder system. Chapter two discusses the literature related to the system, Chapter three illustrates the methodologies used in coming up with the working prototype of the system, Chapter four includes system design and analysis, Chapter five contains the implementation and testing of the system and chapter six contains the summary of the work, discussions and recommendations.

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CHAPTER ONE

INTRODUCTION

1.0 INTRODUCTION

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

1.1 BACKGROUND:

With every passing day the population of this country goes up from the already enormous forty million people that call this land home and with this also comes the burden of feeding the population. Uganda survives mainly on agriculture to feed every person with not only food in adequate quantity, but also of supreme quality. Agriculture is the core sector of Uganda's economy and it presents a great opportunity for poverty eradication as it employs over 80% of Uganda's labor force in its different sectors of Livestock, Fishing, Agro-forestry etc.[1]. Despite this urge contribution to the economy, farmers in Uganda faces a lot of constraints along the value chain which limit their ability to increase productivity and access markets for their produce[2]. The high cost of farm inputs, the lurking pests and diseases, the poor soil quality, shortage of land and the unpredictable weather patterns has regularly nullified the farmer's hard work[3].

In livestock sector, it contributes 40% of the global value of agricultural output and supports the livelihoods. it is indicated that 52% of the households which represents approximately 21 million Ugandans keep livestock and its production is one of the major economic activities which contribute 5.2% and 12.7% to the total national GDP and agricultural GDP respectively[4]. The biggest challenge in this sector is providing green fodder or grass for their livestock. Green fodder is the natural diet for livestock. Its production to meet the current demand has become a greatest challenge among livestock farmers.

Current fodder production methods like the natural grass, paddock system, growing of crops as feeds etc. are failing to keep up with demand due to factors like land shortage especially in urban areas, the poor weather patterns for the natural grass, poor quality land in the semi-arid areas like the Karamoja region and many more that has hindered green fodder production and so the livestock productivity[4]. Due to increasing intensive system of rearing livestock, the need for green fodder is enormous. As the gap between the demand and supply of the green fodder for livestock is becoming unconquerable, researchers and farmers are in search for an alternative fodder or fodder production methods that would restore fodder and livestock production.

Hydroponics is a technology that has revolutionized the green fodder production in the 21st century. Hydroponics fodder system is a method of growing green fodder without soil in an environmentally controlled houses or machines. [5]Many of the livestock farmers are switching to hydroponic fodder production from conventional production methods as the fodder produced by

REFERENCES:

[1] D. Dividend and S. Development, "STATE OF UGANDA POPULATION REPORT 2017," 2017.

[2] "Agriculture and small scale producers in Uganda: Issues, challenges and options for policy Background."

[3] Development Research and Training (DRT), "Agriculture and small scale producers in Uganda : Issues , challenges and options for policy," no. November, pp. 2005–2008, 2012.

[4] S. M. Nalubwama and A. Mugisha, "Organic livestock production in Uganda : Potentials , challenges and prospects Organic livestock production in Uganda : potentials , challenges and prospects," no. May 2015, 2011.

[5] M. D. Bogdonoff, "Hydroponic Green Fodder Production - TANUVAS Experience," *Drug Ther. (NY).*, vol. 20, no. 10, p. 71, 1990.

[6] M. Bakshi *et al.*, "Hydroponic fodder production: A critical assessment," no. December, 2017.

[7] M. R. Sneath and M. F. Mcintosh, "Animal Production Hydroponic Fodder Review," 2003.

[8] "arduino_notebook_v1-1."

[9] P. J. Marozsan, "Hydroponics 101," *How to Ser. Hydroponics 101*, 2007.

[10] "(PDF) Low cost devices for Hydroponics fodder production." .

[11] "Getting Started-Hydroponics."

[12] J. Matos, P. J. S. Gonçalves, and P. M. B. Torres, "An automatic mechanical system for hydroponics fodder production," *Rom. Rev. Precis. Mech. Opt. Mechatronics*, vol. 2015, no. 47, pp. 63–71, 2015.

[13] P. Classification, "Hydroponic monitoring and control apparatus with network connectivity and remote access," vol. 1, no. 19, 2009.

[14] P. Putera, S. Aulia Novita, I. Laksmana, and M. Imran Hamid, "Development and Evaluation of Solar-Powered Instrument for Hydroponic System in Limapuluh Kota, Indonesia," vol. 5, no. 5, 2015.

[15] M. V Shewale and D. S. Chaudhari, "IoT based Plant Monitoring System for Hydroponics Agriculture: a Review," 2018.

[16] A. Uno and R. Front, "Microcontroller Arduino UNO R3 datasheet."

[17] B. Layout, G. Started, U. Guide, and C. Diagram, "Matrix Multimedia LCD Display LCD Display datasheet e," pp. 1–7, 2004.

[18] C. I. T. Do Yeong Park, Je Hyeong Park, Kyung-Bae KIM, Jun Seok Lee, "Liquid crystal display," no. Lcd.

[19] F. Thermal, “Resistors & Circuits,” pp. 1–17, 2015.

[20] F. P. Dpak, “Positive voltage regulator ICs,” no. March, pp. 1–58, 2014.

[21] C. Simpson, “Linear and Switchig Voltage Regulators.”

[22] C. Design, “Jumper wire,” pp. 2–3, 2013.

[23] M. Barela, “Top Wire Types to Consider Wrap-Up,” pp. 1–15, 2018.

[24] H. Herrmann and H. Bucksch, “Temperature Sensor,” *Dict. Geotech. Eng. Geotech.*, pp. 1378–1378, 2014.

[25] “Cooling fan 2018,” 2018.

[26] R. S. Ranjan, “Aqua-Tel,” no. July 2000, pp. 2–3, 2018.

[27] “เซ็นเซอร์วัดความชื้นในดิน Soil Moisture Sensor,” vol. 6440, p. 94545.

[28] B. Meijer, “Arduino IDE user guide,” no. March, pp. 1–6, 2014.

[29] “PROGRAMMING WITH ARDUINO.”

[30] Arduino, “Arduino For Beginners What Is Arduino ?,” *Www.Arduino.Cc*, 2018.

[31] A. Applications, “Additional Applications 7,” pp. 167–182.