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FINAL YEAR PROJECT IMPLEMENTATION**

**TOPIC:**

**LIVESTOCK-OPERATED PUMP WATERING SYSTEM**

**BY**

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A project report submitted to the department of computer engineering in partial fulfillment of the requirements for the award of bachelor's degree in computer engineering of Busitema University.

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## **DECLARATION**

I NYIRAMUCYO RACHEL, Reg No. BU/UP/2015/352, hereby declare that this project is my original work except where explicit citation has been made and it has not been presented to any higher learning institution for any academic award.

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Sign: .....

Date: .....

## **APPROVAL**

I certify that the project under the title “A LIVESTOCK-OPERATED PUMP WATERING SYSTEM” has been done under my supervision and is submitted to the board of examiners with my approval.

**Ms. ASINGWIRE BARBARA KABWIGA**

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## **DEDICATION**

I would like to dedicate this report to my beloved family especially my mom and dad Mr. and Mrs Nyilimanzi with their confidence in me to overcome the entire obstacle in my journey to success. After all, we all have dreams, but in order to make dreams come into reality, it takes an awful lot of determination, dedication, self-discipline and effort.

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## **ACRONYMS AND ABBREVIATIONS**

<b>AC</b>	Alternating Current
<b>DC</b>	Direct Current
<b>GDP</b>	Gross Domestic Product
<b>N</b>	Nitrogen
<b>Na</b>	Sodium
<b>PCB`</b>	Printed Circuit Board
<b>PWM</b>	Pulse Width Modulation



## **ABSTRACT**

A Livestock-operated watering system is a system designed special for livestock to provide them access to clean drinking water on the farm without human intervention. In Uganda, dairy farming is increasing due to its great benefits in terms of its products namely milk and it being highly profitable which increases the country's economy as compared to other Agricultural practices like poultry keeping among others. However, dairy farming normally involves much labor costs in providing safe and plenty of drinking water for the animals to drink for their proper body functioning, physiological processes and high milk production, therefore if not monitored regularly, livestock can be deprived of water and this can be of great loss to the farmers. The currently existing livestock watering systems do not have an automated mechanism for providing adequate water to cattle without human intervention. This has led to decrease in the country's economy and losses to the dairy farmers. With these challenges faced and studied into from different forms of literature and observations, a Livestock-operated pump watering system has been developed through a number of procedures, testing and evaluation done. The main aim of this system is to provide drinking water to cattle whenever they need it. In this system, four major functionalities have been achieved namely: Automatic pumping process of drinking water to livestock operated by the animal itself in form of stepping on weight sensing unit and its presence detected by sensors; Automatic detection and monitoring of water levels in the storage water tank and drinking reservoirs; automatic re-filling of water in the storage tank from a main water supply to make sure that the tank always has water stored in it ; and finally an outlet provision of waste water after cleaning the drinking reservoir.

In conclusion, this system will reduce the increasing losses in dairy farming mainly in terms of labor costs and productivity.

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# CHAPTER ONE

## 1.1 Background

Livestock accounts for 53% of the agricultural capital stock and contribute 30% to agricultural Gross Domestic Product(GDP) with the dairy sector second to cereal products contributing over 50% to the National GDP of the total output from the livestock subsector[1]. Smallholder dairy production dominates the country of Uganda, with over 90% of the national herd owned by smallholders [2]. Uganda has about 15 million cattle. Out of the 3.8 million households, about a third (1.2 million) own cattle and are therefore potentially involved in the dairy industry [3]. It's for this reason therefore that farmers pride in keeping livestock due to their benefits to the economy. Important to note is that these animals require adequate water and enough pastures in order to yield good yields. [4].

Water constitutes 60 to 70 percent of a livestock animal's body and greatly contributes to a various number of functions [5]. Water is necessary for maintaining body fluids and proper ion balance; digesting, absorbing, and metabolizing nutrients; eliminating waste material and excess heat from the body; providing a fluid environment for the fetus; and transporting nutrients to and from body tissues[6],[7]. Dairy cattle get the water they need by drinking and consuming feed that contains water, as well as from metabolic water produced by the oxidation of organic nutrients [7]. Water loss from the body occurs via urine, feces, and milk; through sweating; and by evaporation from body surfaces and the respiratory tract. The amount of water lost from a cow's body is influenced by the animal's activity, air temperature, humidity, respiratory rate, water intake, feed consumption, milk production and other factors[8]. Milk is composed of nearly 87% water and thus dairy cattle need plentiful water to achieve high milk production[5].

Different options for watering livestock have been available today which include; drinking water sourced from shallow wells and valley bottoms. Other sources include rooftops, boreholes, water pans and piped water[10]. Existing pumping systems as well include wind powered pumps, gravity flow and solar powered livestock watering systems, mobile cattle watering systems and Automatic livestock waterers[10]. Challenges with available options include; containing high salt levels, saline in natural sources harmful for dairy cattle; limited drinking hygiene[9]; Majority of the farmers involve manual labor such as fetching water from water sources to the farms involving

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