



FACULTY OF ENGINEERING

**DEPARTMENT OF AGRICULTURAL MECHANIZATION AND
IRRIGATION ENGINEERING**

**BACHELOR OF AGRICULTURAL MECHANIZATION AND
IRRIGATION ENGINEERING**

FINAL YEAR PROJECT REPORT

**DEVELOPMENT OF A DECISION SUPPORT SYSTEM FOR SUPPLEMENTARY
DRIP IRRIGATION USING SOIL MOISTURE SENSOR METHOD.**

BY

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***THIS PROJECT REPORT IS SUBMITTED TO THE DEPARTMENT OF
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FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF A DEGREE OF
AGRICULTURAL MECHANIZATION AND IRRIGATION ENGINEERING AT
BUSITEMA UNIVERSITY.***

16TH APRIL, 2025

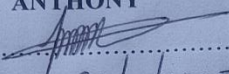
ABSTRACT

The global population, currently at 8.1 billion, is projected to reach 9.7 billion by 2050, intensifying the global demand for food. Africa, particularly Uganda, is experiencing rapid population growth, with Uganda's population reaching 45.9 million in 2024 and agriculture remaining the cornerstone of its economy. Despite 80% of Uganda's land being arable, only 35% is under cultivation. Agriculture contributes significantly to GDP and employment but remains heavily reliant on rain-fed systems, which are increasingly threatened by climate-induced droughts and floods. Irrigation has proven essential in boosting agricultural productivity, with irrigated lands contributing up to 40% of global food output. However, poor irrigation practices in Uganda have led to waterlogging, inefficient water use, and declining crop yields. Although the government has promoted various irrigation systems through the National Irrigation Policy and Vision 2040, improper application continues to undermine food security and sustainable resource management. This study proposes the development of a precision decision support irrigation system that utilizes real-time data from soil moisture, temperature, and humidity sensors to guide irrigation intervals, depth, and water quantity. Such a system promises improved crop productivity, water-use efficiency, and alignment with Sustainable Development Goals (SDG 2 and SDG 12), thereby supporting Uganda's long-term agricultural resilience and food security.

DECLARATION

This project report is as result of research and citation and it has never been submitted in for any degree, certificate or diploma to any university or institution of higher learning.

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APPROVAL

This project report has been submitted as a partial fulfilment for the award of Bachelor's Degree in Agricultural Mechanization and Irrigation Engineering under the supervision and guidance of;

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DEDICATION

This report is dedicated to my family, my project supervisors Mr. Igga Huzairu, Mr. Kusemererwa Joseph and friends who contributed effortlessly to this report write up. May the almighty continue to bless them all abundantly in all their endeavours.

CONTENTS

ABSTRACT.....	ii
DECLARATION.....	Error! Bookmark not defined.
APPROVAL	Error! Bookmark not defined.
ACKNOWLEDGEMENT.....	v
DEDICATION.....	vi
LIST OF FIGURES	ix
LIST OF TABLES	x
ABBREVIATIONS	xi
1.0 CHAPTER 1: INTRODUCTION.....	1
1.1 Background.....	1
1.2 Problem statement.....	1
1.3 Main objective	2
1.4 Specific objectives.....	2
1.6 Justification.....	2
1.7 Research scope.....	2
2.0 CHAPTER TWO: LITERATURE REVIEW	4
2.1 Introduction.	4
2.2 Methods of Irrigation.....	4
2.3 General efficiency of drip irrigation system	6
2.4 Key factors considered during irrigation scheduling.....	7
2.5 Irrigation Scheduling Systems	7
2.5.1 ET-based.....	7
2.5.2 Dynamic programming	8
2.5.3 Personal experience and visual observation of the plant and soil methods	8
2.5.4 Soil moisture sensor-based irrigation scheduling method	9
2.5.5 Gravimetric method	10
2.5.6 Weather-based irrigation scheduling method.....	11
3.0 CHAPTER 3: METHODOLOGY.....	12
3.1: Introduction.....	12
3.2 Study area description	12

3.3 Specific Objective 1: To Determine The Crop Irrigation Threshold.	12
3.4 Specific Objective 2: Designing An Automatic Irrigation And Alert System Using A Gsm Module To Irrigate The Crop With The Specified Water Needed.	18
3.5 Specific Objective 3: To test and validate the performance of the developed system.	30
CHAPTER 4: RESULTS AND DISCUSSIONS	32
CHAPTER 5 : CONCLUSION, CHALLENGES AND RECOMMENDATIONS	42
Conclusion.....	42
Challenges	42
Recommendations	42
References	43
Appendix	47

LIST OF FIGURES

Figure 1. Chart showing different methods of irrigation practiced.

Figure 2,3,4 Pictorial presentation of procedures to obtain ET_0

Figure 3. Showing components of soil water reservoir

LIST OF TABLES

Table 1. showing the relationship between soil moisture and appearance

Table 2. Showing K_c values for Maize at different growth stages

Table 3 shows values of permanent wilting points, field capacity and evaporation parameters for most soil types.

ABBREVIATIONS

MAAIF - Ministry of Agriculture, Animal Industry and Fisheries

UBOS - Uganda Bureau of Statistics

SDG - Sustainable Development Goals

GDP - Gross domestic product

B.C – Before Christ

GSM – Global System for Mobile Communications

SMS - Short Message Service

USA – United States of America

RAW – Readily available moisture

TAW - Total available moisture

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