



**BUSITEMA
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Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

FINAL YEAR PROJECT

**OPTIMIZATION OF ELECTRICITY CONSUMPTION FOR A
CHAIN OF RING FRAME MACHINES USING GENETIC
ALGORITHM**

BY

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ABSTRACT

The textile industry has relatively high energy consumption compared to other small and medium industries. Energy is one of the main cost factors in the textile industry and accounts for 15% to 20% over the production cost and it stands next to raw material cost. The increase in energy consumption is attributed to inadequate maintenance of the ring frame machines, lighting system and mechanical ventilation.

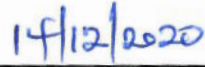
Intelligent Analysis Systems (IAS) are gaining recognition in developing countries, Uganda inclusive. This proposal describes the use of genetic algorithm to optimize the electricity consumption from a chain of ring frame machines.

Keywords: Energy consumption, optimization, genetic algorithm.

DECLARATION

I ECHODU JOREM Reg. No BU/UG/2016/20 hereby declare that this project is my original work and that the information contained in this project is out of my hard work and research, except where explicit citation have been made and it has not been presented to any Institution of higher learning for any academic award.





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APPROVAL

This is to certify that the project under the title "Optimization of electricity consumption for a chain of ring frame machines using genetic algorithm" proposed under my supervision and is now ready for examination.

Supervisors:

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Date: _____

Name: Mr. KASEDDE Allan

Signature: _____

Date: _____

DEDICATION

I dedicate this project research to my parents: Ms. Akwii Deborah and Mr. Omumwa Michael for their hard work, great love, moral and unconditional support to make me a successful person through attaining better education.

I also dedicate it to my siblings and well-wishers for their support morally and socially.

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TABLE OF CONTENTS

ABSTRACT	i
DECLARATION	ii
APPROVAL	iii
DEDICATION	iv
ACKNOWLEDGEMENT	v
CHAPTER ONE	1
1.1 INTRODUCTION	1
1.2 BACKGROUND OF THE STUDY	1
1.3 PROBLEM STATEMENT	3
1.4 OBJECTIVES	3
1.4.1 Main objective	3
1.4.2 Specific objectives	3
1.5 JUSTIFICATION	3
1.6 SCOPE OF THE STUDY	4
1.6.1 Conceptual scope	4
1.6.2 Geographical scope	4
1.6.3 Time scope	4
CHAPTER TWO	5
LITERATURE REVIEW	5
2.1 Introduction	5
2.2 Energy consumption	5
2.3 Algorithms and techniques used for the energy optimization	6
2.4 Genetic algorithm	8
2.4.1 Parameters affecting the GA output	9
CHAPTER THREE	11
METHODOLOGY	11
3.1 Introduction	11
3.2 Materials / Equipments	11
Specific Objective one:	11
3.3 Energy audit of the electricity consumption of the ring frame machines.	11
3.3.1 Energy auditing	11
3.3.2 Energy audit flow chart	11

3.3.3 Auditing of different parameters.....	12
Specific Objective two:	13
3.4 To develop a model for energy consumption optimization of the process using genetic algorithm.....	13
3.4.1 Development tools	13
3.4.2 Proposed Model flow chart	14
3.4.3 System implementation.....	15
3.4.4 Testing and validation	19
Specific Objective three:.....	19
5.2 Establishing the costs saved from the optimization model.....	19
3.5.1 Procedures of performing a cost benefit analysis.....	20
CHAPTER FOUR.....	21
4.0 RESULTS AND DISCUSSIONS	21
4.2 Graphical representation of electricity energy consumption for each parameter.....	22
4.2.1 Effect of lighting system on electricity consumption.....	22
4.2.2 Effect of venting system on electricity consumption.....	23
4.2.3 Effect of maintenance on electricity consumption	23
4.3 Validation of the model.....	24
4.3.1 Mean Absolute Percent Error (MAPE).....	25
4.4 Cost benefit analysis.....	25
4.4.1 Bulbs analysis	25
4.4.2 Venting analysis.....	26
4.4.3 Maintenance analysis.....	26
4.4.4 Cost benefit calculations	26
CHAPTER FIVE	27
CONCLUSION AND RECOMMENDATION	27
5.0 Reflect on the project.....	27
5.1 Conclusion	27
5.2 Recommendation.....	27
REFERENCES.....	28
APPENDIX.....	30
PYTHON COMMANDS.....	30

LIST OF TABLES

Table 1 Energy audit form for lighting system	12
Table 2 Energy audit form for venting system.....	12
Table 3 Energy audit form for maintenance	13
Table 4 Input data for the system.....	21
Table 5 Actual and forecasted data for the different parameters	24

LIST OF FIGURES

Figure 1 Electricity consumption in the spinning department	2
Figure 2 Energy audit process according to ISO 50002	11
Figure 3 system flow chart for implementing genetic algorithm.....	14
Figure 4 Effect of lighting system on electricity consumption	22
Figure 5 Effect of venting system on electricity consumption	23
Figure 6 Effect of maintenance hours on power consumption.....	23
Figure 7 Combined effect of maintenance on power consumption	24
Figure 8 Comparison between actual data and predicted data.....	25

LIST OF EQUATIONS

Equation 1 Fitness equation to determine fit individuals in the population.....	15
Equation 2 Mean Absolute Percentage Error for system validation.....	19
Equation 3 Energy equation.....	26

LIST OF ACRONYMS / ABBREVIATIONS

GA.....	Genetic Algorithm
AI.....	Artificial intelligence
MAPE.....	Mean Absolute Percentage Error
ISO.....	International Standard Organizations
CBA.....	Cost Benefit Analysis
HVAC.....	Heating, Ventilation and Air Conditioning
EJ.....	Exa- Joules
UNIDO.....	United Nations Industrial Development Organization
SEC.....	Specific Energy Consumption
PID.....	Proportional Integral and Derivative

CHAPTER ONE

1.1 INTRODUCTION

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

1.2 BACKGROUND OF THE STUDY

Energy plays an important role in industrial development and economic growth rate of country. The energy share of the global economy accounts 8.2% of the GDP.

Out of the total global available energy, consumption of energy by the industrial sector is 51%, household sector is 18% and commercial sector is 20%(British thermal unit, 2011). The consumption of energy is increasing at a fast pace while available resources remain limited. The global need for energy is increasing on an average by about 2.4% every year. (Mouzon, Yildirim, & Twomey, 2007).

Textile industries manufacturers face a competitive environment. This has compelled manufacturers to reduce production costs without affecting the production and quality of product. Due to spike in energy prices, this has led to an increase in the manufacturing cost as well as decrease in the quality of the product produced.(Li, Xing, Wu, Wang, & Luo, 2016)

Textile industry is the third largest energy consuming industry after chemical and engineering sector, due to modernized machines and continuous usage of the equipment in inefficient operating parameters.(Bruce, 2013). Energy is one of the main cost factors in the textile industry and accounts for 15% to 20% over the production cost and it stands next to raw material cost.(Patil, Patil, & Fulare, 2018).

In a spinning industry, energy is consumed mainly in the form of electricity. At each stage of spinning such as blow room, carding, ring frame the energy is consumed in some manner. Beside this some electricity is also consumed in lighting, compressors and humidification systems. Also, to increase the production and to reduce the labor cost different automations have been done in a ring spinning industry, leading to increase in the energy consumption.(El, Hosny, & Mohamed, 2012).

Electric energy is one of the most commonly used energy types in the textile and clothing plants, used to supply energy for textile machinery, heating and cooling control systems, lighting, and

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