BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF TEXTILE AND GINNING ENGINEERING

PREDICTING SHRINKAGE OF KNITTED FABRICS USING ANFIS

BY

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A FINAL PROJECT REPORT SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN TEXTILE ENGINEERING OF BUSITEMA UNIVERSITY

MAY 2015

DECLARATION

I Ninsiima Sylivia hereby declare to the best of my knowledge that the work presented in this report is original and have not been presented in any institution anywhere for any degree, diploma or any award.

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APPROVAL

This is to certify that report has been submitted for examination with the approval of the following supervisors.

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Finally I thank my fellow students who have offered their help in form of advice and information.

DEDICATION

To my dear parents Mr. and Mrs. Barigye Deus and all my friends who have done their very best to ensure that I get good education and the department of textile and ginning engineering for the technical advice they have given me. May the good Lord bless you.

ABSTRACT

The project used ANFIS to predict the shrinkage of weft knitted fabrics comprising of cotton only and blend with polyester. GSM, stitch length, courses per inch and wales per inch were used as input parameters and shrinkage as the output for the model.

Fabrics were produced using a circular knitting machine at Southern Range Nyanza Limited in Jinja, Uganda. Tests were carried out in the laboratories on the fabric samples to obtain the data. The data obtained was then used to build the ANFIS model. This model was tested and validated.

The ANFIS model was successfully modeled to predict the shrinkage of knitted fabrics with the R-square of 0.9683, 0.9692 and 0.0013 for single jersey, rib and interlock respectively. The developed model was used to study the relationship between the inputs and the outputs and conclusion, recommendation made.

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ACRONYMS

ANN	Artificial Neural Networks
ANFIS	Adaptive Neuro-Fuzzy Inference Systems
FIS	Fuzzy Inference System
MF	Membership Function
MSE	Mean Square Error
PC	Polyester/Cotton
RMSE	Root Mean Square Error
SSE	Sum Squared Error

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background of the Study

1.1.1 Knitting

Knitting is the production of fabric by forming loops with yarn, which are interlaced in a variety of ways to form the fabric *(Spencer, 2001)*. Knit fabrics provide outstanding comfort qualities and have long been preferred as fabrics in many kinds of clothing. Knit fabrics are produced on different machines with different knit stitches and conditions to create different patterns and fabric types leading to different qualities (*Kavustruran, 2008*).

Due to better extensibility in structure, knitted fabrics provide better fit and comfort to the wearer (*Anbumani, 2006)*. The knit fabrics produced with cotton fibre are ideal for use directly on the skin, principally due to the physical properties of high elasticity and softness. However, cotton fabrics are susceptible to dimensional changes, i.e. they have low dimensional stability (*Antonio et al, 2010*).

1.1.2 Shrinkage

Dimensional stability means that the fabric maintains the dimensions with which it was manufactured, without changing with use. The dimensional stability of knitted fabrics is an important factor of the knitting industry. Fabric shrinkage and spirality is the ultimate problem if the dimensional stability of the knitted fabrics is not properly taken care (*Hossain et al, 2012*).

Shrinkage is a dimensional change resulting in a decrease in length or width of a specimen subjected to specified conditions. The reduction in length and width of fabric is induced by

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