



# National Textile University

Three on-going Academic Research Projects submitted by National Textile University faculty have been accepted for displaying in the “[National Conference on Setting Standards for 21<sup>st</sup> Century Pakistan](#)” being organized by Higher Education Commission, Pakistan on May 26, 2011 at Serena Hotel, Islamabad.

Brief detail of research projects;

## **Research Project -1**

**Title: A Knowledge-Based Expert System to Diagnose Spinning Faults For Producing High Quality Yarn**

### **Abstract**

An expert system uses knowledge-based to diagnose the respective causes of faults in the spinning processes. There are few expert systems already developed for the textile sector but still there are many untapped sectors of the textiles and one of them is spinning. The quality requirement for the yarn is becoming more stringent, but depends mainly on which, the human expertise, is getting more limited and expensive and are mortal as well, hence the use of expert systems is becoming more crucial. The expert system developed is able to assist technician in controlling the undesirable variations in the yarn due to spinning problems, which is the main cause of the poor quality. Expert systems are free of any limitations that are associated with the human experts. Also, this tool can significantly reduce the training and support costs and can increase employee and employer satisfaction.

Cotton is the backbone of the Pakistan’s textile industry. It has many qualities and characteristics, which make it one of the most abundantly used textile fibres in the world The textile industry is comprised of a diverse, fragmented group of establishments including fibre production, transformation of fibres into yarn, conversion of the yarn into fabric or related products, and dyeing and finishing of these materials at various stages of production. After fibre production, the first and the foremost step in the value-chain of woven and knitted fabrics is the

yarn production. Production of a good quality yarn, which is free from undesirable variations and defects, is a prerequisite for the production of good quality fabrics. However, the production of good quality defect-free yarn is not so easy and requires a lot of expertise. As quality requirements are becoming more and more stringent in textiles, human expertise in such a specialized area as yarn production is becoming more and more limited and expensive.

Artificial intelligence-based computer programs, called expert systems, have received a great deal of attention in recent years. The reason for all the attention is that these programs have been used to solve an impressive array of problems in a variety of fields. An expert system is “an intelligent computer program that uses knowledge and inference procedures to solve problems that are difficult enough to require significant human expertise for their solutions.

*Project Supervisor: Dr. Tanveer Hussain*

*Project Co-Supervisor: Dr. Mumtaz Hassan Malik*

*Project Presenter at Site (Serena Hotel Islamabad)*

*Mr. Zafar Javed*

*Mr. Muhammad Bilal*

## **Research Project -2**

**Title: Development of PLCE**

**Abstract:**

In any combat mission or otherwise soldiers are required to carry ammunition, water, food, protective equipment and supplies with them and to solve this issue of consignment transportation by the armed combatant Personal load carrying equipment (PLCE) is the tactical solution. The purpose of PLCE is that a soldier could possess every possible needed item with them but in a totally managed, compact and orderly manner.

The aim of this project, that National Textile University undertook, was product development and production of such PLCE items. About ten different articles in total that comprise of PLCE were designed by our team of experts that are going to be helpful for an individual soldier for the above mentioned cause. PLCE items included Ruck sack, RPG ammo carrier, Chest Rig, Military Hydration system, Pistol hoister etc. After the initial phase of product development of these articles, they were taken for trial run and during this phase few amendments in designs of the products were induced for better quality and cost reduction. Process flows were redesigned to achieve optimum productivity so that cost of the product should remain low. Every aspect of the product from raw material to production equipment till final end product was closely worked upon.

The end products produced during this project were highly purpose built and were able to conform to the intended requirements such as proper adjustment of supplies in there allocated spaces, comfortable to carry, able to withstand high loads without rupture, design was such that center of gravity of a soldier should not vary much while using PLCE, so to eradicate the problem of imbalance specially when on steeply inclined planes.

*Project Supervisor: Dr. Mumtaz Hassan Malik*

*Project Co-Supervisor: Mr. Zafar Javed*

*Project Presenter at Site (Serena Hotel Islamabad)*

*Mr. Zafar Javed*

*Mr. Muhammad Bilal*

### **Research Project -3**

**Title:**

**Advance Camouflage Pattern Development (NTU-MULTICAM)**

**Abstract:**

In a combat uniform, in addition to all other functional requirements, the most important is the surface pattern of the fabric. Special kind of patterns used for the combat uniforms are known as camouflage designs. These designs fulfill special kind of functional needs as the wearer is to be exposed to variety of environments where he should be able to perform his tasks almost in undetectable ways. Traditionally, camouflage patterns are created by laying repeated patterns of different colors in order to simulate the natural environments where that uniform user intends to work or hide. The patterns are typically abstract shapes, intent being to break up the silhouette of human figure against the particular background. However these patterns may suite for one particular area or environment but they surly are not suitable for all kind of the environments.

This project was aimed to produce a pattern that provides camouflage in variety of environments. Contrary to traditional method of design development, in this project design was developed by following the scientific methods. A comprehensive study of the country's topography covering eastern, northern and southern borders was carried out using photographic imaging and material collection. The collected images were analyzed and sorted out to a final comprehensive collection. These images and the collected materials, like leaves, earth samples etc were used to develop different patterns that mimic the environment of almost all areas under study. Developed patterns were used for generating the computer manipulated imagery for finally creating the camouflage pattern.

Finally five variations of the designs were generated. Each design was developed by using three colors and two tonal variations of each color. Printing of these designs on the fabric was done with specially formulated dyes resulting in single color appearance in the visible range of the spectrum and a camouflage appearance in the near infrared of the spectrum. This gives the wearer an advantage to conceal himself both from visual and IR detectors "night vision devices"

*Project Supervisor: Dr. Mumtaz Hassan Malik*

*Project Co-Supervisor: Dr. Tanveer Hussain*

*Project Presenter at Site (Serena Hotel Islamabad)*

*Mr. Zafar Javed*

*Mr. Muhammad Bilal*

