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Development of a Computerized System for Fabric Structure Design based on Dobby Device Mechanism

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ABSTRACT

Generally, a fabric design can be established as follows: firstly. The required fabric design is planned on the punched plastic card using the punching machine. Secondly, the punched plastic card is used by the dobby device that attached to the textile machine (rapier weaving loom) to make the final fabric design as required.

In this study, a direct interfacing system between a personal computer and the textile machine (rapier weaving loom) was established to replace the conventional system (plastic card and punching machine).

This system is applied in the University of Gezira to enhance performance (decrease the design time, requirements and the complexity) of the existing conventional dobby device. The system was developed using Microsoft Visual Basic, Personal Computer, coil, and Parallel Printer Port. The system reads the machine statues via the input lines connected to the power adapter and a mechanical sensor. Then the system issues a suitable action on the machine by generating the electric signal applied on the coil. The magnetic field controls the shaft movement and selects the required color according to the design parameters. The system also repeats the color selection process until the total length required is completed.By using this system; the woven design operations become quite simple, easy and flexible.

INTRODUCTION

No doubt the computer plays major roles in various aspects of life as general and renders significant impact on the industry sectors in particular. The computer aided design (CAD) and computer aided manufacturing (CAM) systems are widely used in textile industry which enhanced the capability of design, reduce cost, saved time and increased productivity.

Three devices "as known" are used to construct the fabrics (Cam, Dobby and Jacquard), each device has the scope limit of design which is considered as a constraint. The dobby device is widely used to construct fabrics design required not more than twenty-four shafts, but the dobby which controls sixteen shafts is commonly used. Nowadays, the mechanical dobby has been replaced with an electronic dobby and numerous patents of electronic dobbies are currently working in many countries. With the introduction of computer aided design (CAD)and its many software capabilities, the possibilities are endless. The entire process of designing a fabric is revolutionized. Where previously designers used to labor over graph paper and stencils, now they simply have to play with a mouse or stylus pen to come out with innovative designs. The result is not only an increase in speed, but greater accuracy than the manual process. It is no wonder that even small-scale textile design and manufacturing companies are using CAD systems. Microprocessor and microcomputers are most integrated resources with capability to be implemented in many fields of human life activities. This present paper is tried to design software to interface a computer with a loom with a dobby to generate cloth ornamentational designs. For the last fifteen

years, the quiet revolution of micro technology has taken place and it is promising a bright future for most industries including textiles. Micro electromechanical systems (MEMS) also popularly referred to as micro machines, nano machine, or transducers are characterized by being less than a square millimeter in size (Benson, et . ale, 1993). In the most general form, MEMS consist of mechanical micro structures, micro sensors, micro actuators, and electronics, all integrated onto the same chips.(Mehregany, 1992). A sensor is defined as a device that provides a usable electrical output signal in response to a signal (Fraden,1996). An actuator, the reverse of a sensor, is a device that converts an electrical signal to an action, while transducer can be considered as the device that transforms one form of signal or energy into an others form. Therefore, the term transducer can be used to include both sensors and actuators (Mehregany and Dewa, 1995).

OBJECTIVES

The overall objective of this study is to apply a suggested software to establish a direct interfacing system between the personal computer and a rapier weaving loom to

replace the exist punched plastic card to facilitate the performance and simplify the design operation.

MATERIALS AND METHODS

The rapier loom of Toyoda make, associated with conventional dobby device, was used. Personal computer, power adapter, sensors, Microsoft visual basic version 6.0, and parallel port of twenty five pins female were also used. Out of these pins eight lines connected to personal computer through the parallel port, which used for colour selection, adapter and sensors. On the other hand the user interfacing dealt with design parameters, power status and product monitoring is generated by using visual basic version 6.0. in this work the design card and the elements operating such card is completely omitted and no longer used. The weft and warp intersection used to construct fabric design generated electronically by using magnetic field associated to each needle. The conventional woven design method representing lifting plan of design concerned, which completely depends on punching card, has been replaced by digital or computerize method. The warp overlap, is represented by logic (One) and weft overlap is represented by logic (Zero). These sequences are generated electronically from a personal computer

and applied on a suitable magnetic field to perform the function of traditional punching card. For direct machine interfacing, eight lines are required: six lines used for output and two lines used for input. The software designed by using Visual basic is capable to read both the machine power on and the production design parameters. Then it calculates the color selection repetition and accordingly it creates the design (see Figures I and 2). It has an interactive control panel composes of a number of windows. The main window is used for inputting data required for production, while the other windows are used to display the product progress and the machine status .

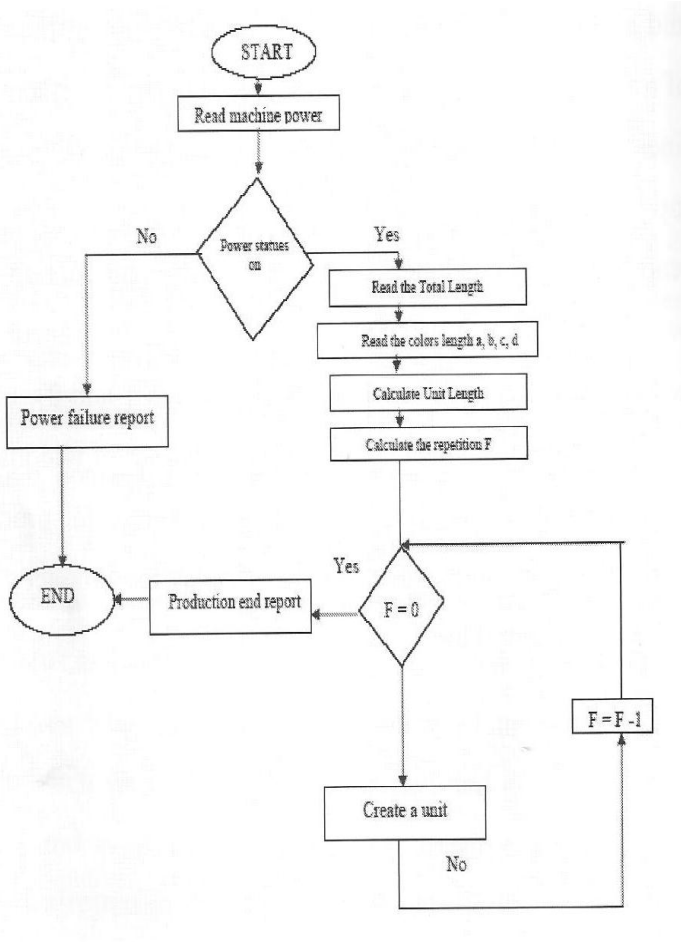

Fig 1: Machine interfacing algorithm (Create unit is

Explained in Figure 2)

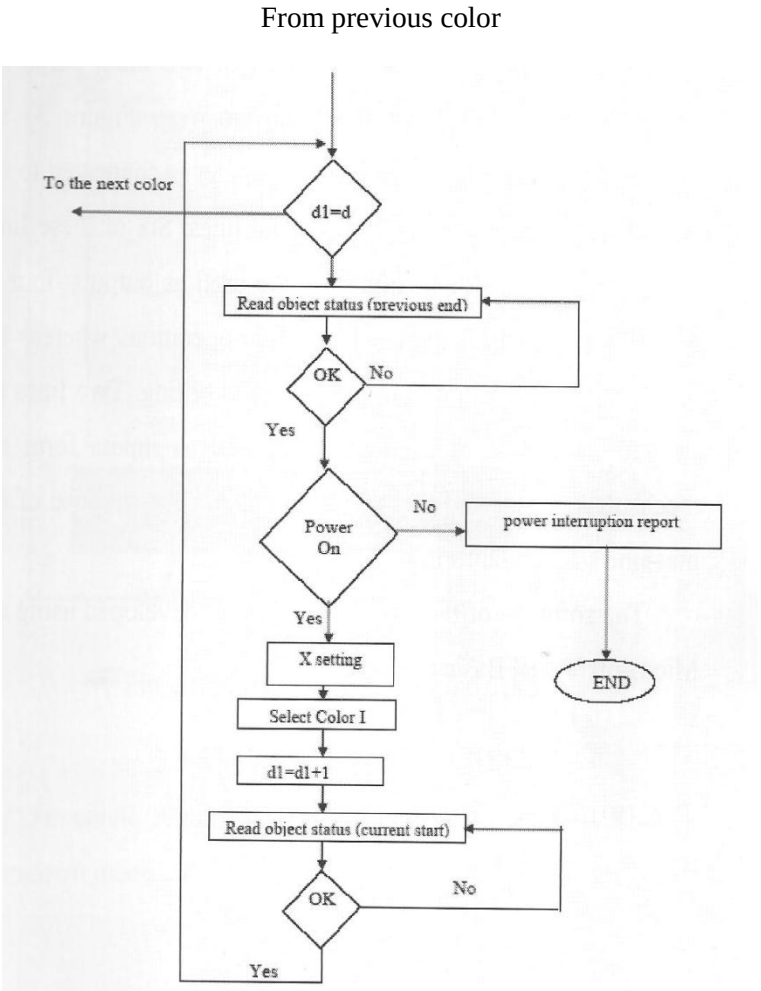

Fig 2: algorithm for machine interfacing – unit Creation (colors repetition)

4.0 SYSTEM DESIGN

The proposed system is composed of two main parts: the hardware and software. In the hardware, (see Figure 3) the parallel printer port of the personal computer is connected to the weaving loom machine via eight digital lines. Six of these lines (in the right hand side of Figure 3) are used as outputs: four of them are reserved for the color selection operations whereas the remaining two lines are used for the shafts setting. Two lines (in the left hand side of Figure 3) are used as inputs form the mechanical sensor and the power adapter for the purpose of the machine status monitoring.

The software of the proposed system is developed using the Microsoft Visual Basic 6.0.

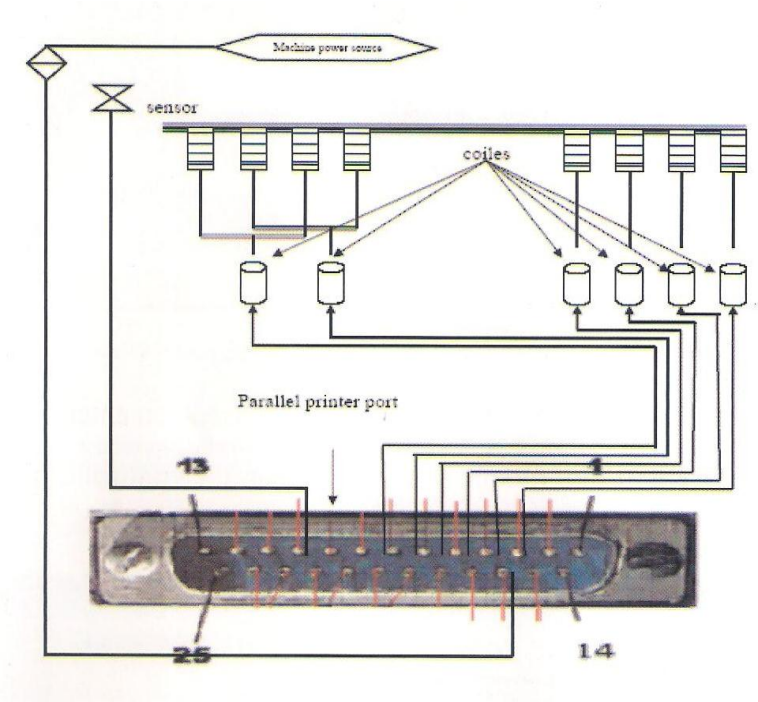

Fig .3 The block diagram of the design

5.0 SYSTEM TEST AND RESUITS

To create a new design select (NEW) from (CREATE) dropdown menu on the main window shown in Fig.4.

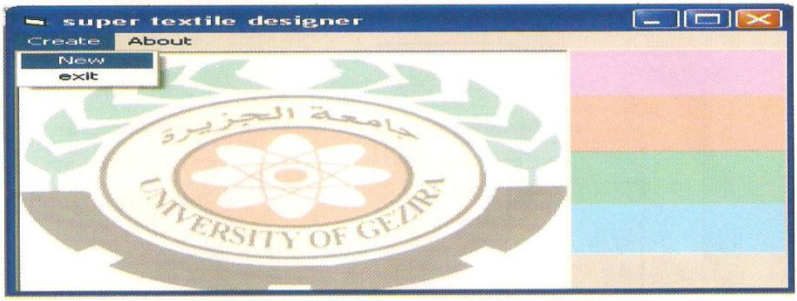

Fig.4. Main Window

then the second screen is opened. The user then enters all the parameters of the product see Figs. then the command button (start design). is pressed

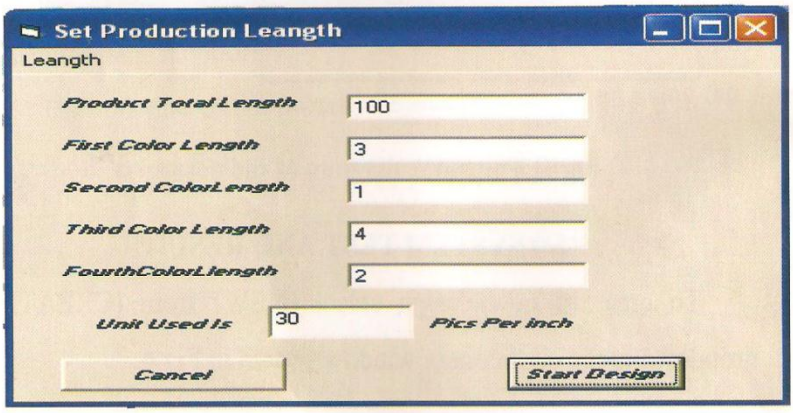

Fig.5 product input data

Immediately the system start to discover the power status. On the normal case (power is on) the design starts and the

monitoring screen with a meter indicator appears see figures 6, 7, 8 & 9.

Fig. 6 Operation of product ion Starting

Fig. 7 Production % age completed

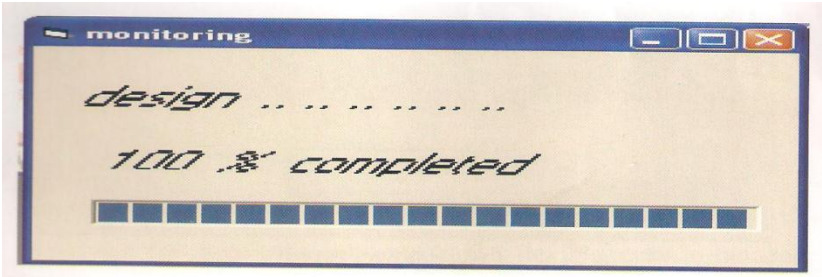

Fig.8 Production completed

When the fabric design is completed as planned, the finalization report shown by fig 5.4 is viewed.

Fig.9 final report massage

If at any stage of the design progress a power failure occurs (or no power when start), the related power report shown in figures10 & II is seen

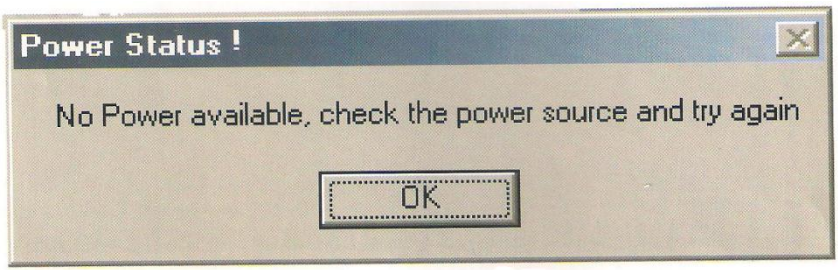

Fig. 10 power report

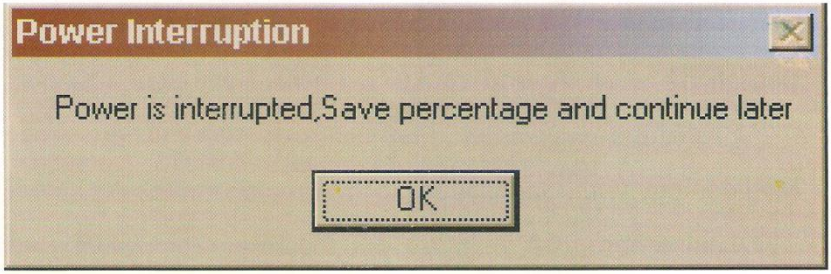

Fig. 1 1 power interruption report

6.0 CONCLUSION

Direct interfacing with regard of all design factors and handshaking requirements is successfully established. The punching machine and the punched plastic card in the traditional system were completely omitted, Therefore, the developed system takes a less design time compared with the time taken by the traditional system.

The developed system is considered to be very simple, low cost and a reliable one.

This gives a green light to more advanced systems to be created for more efficient, extendable, flexible, easy to be used and low cost fabric structure methods.

7.0 REFERENCES

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