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A Novel idea for monitoring the Performance of Data Extension Control Board for Textile Industry using Embedded Technology

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Abstract **–Textile Industry is one of the most complicated manufacturing industries due to its fragmented and heterogeneous nature mostly dominated by small and medium enterprises. Mostly in textile industry power looms are used which is having electronic jacquard for design printing. In electronic jacquard lot of electronic boards are used such as design inserting board, data extension control board, magnetic module etc…In the proposed idea performance of data extension control board is taken for analysis. Generally the purpose of data extension control board is to split the master data into 16 set of 8 bit serial data. In manufacturing phase, there exists an complication during the testing of data extension control board. During the testing period, the output of this board have the problems like absence of clock, data mismatching, bit storage problem and voltage level variation. Nowadays in the industry testing is done manually. Due to manual testing lot of quality issues araises from the consumer side. To overcome this problem a methodology is proposed to automate the testing of this board which also rectifies the problemof low efficiency and high error rate in manual testing.**

Keywords **–Auto testing, Data extension control board, Arduino atmega2560, Multiplexer, Testing pattern generator,Resulting pattrern, Opto coupler.**

I. INTRODUCTION

The Indian textile industry has an awesome existence in the Indian economy. It is second largest employerafter Agriculture in India. It is one of the largest in the worldwith a massive raw material and textiles manufacturing base. Currently, it contributes about 14 percent to industrial production, 4 percent to the GDP, and 17 percent to the country's export earnings. Around 35 million people are directly employed in the textile manufacturing activities. Indirect employment including the manpower engaged in agricultural based raw-material production like cotton and related trade and handling could be stated to be around another 60 million. In india Textile Industry has three main segments as mill sector, handloomsector and decentralized power loom sector. The power loom consists of electronic jacquard machine. Electronic jacquard machine having design inserting box, data extension control board and magnetic module etc…The purpose of design inserting board is to convert the image to data, Data extension control board is to split the master data into 16 set of 8 bit serial data, Magnetic module is to energize or de- energize the magnetic hooks depends on corresponding data. In the proposed work data extension control board is used.The output of this board having problems like absence of clock, data mismatching, bit storage problem and voltage level variation. The manufacturing sector faces a lot of problem due to testing of data extension control board. At present testing process is done manually in manufacturing sector. Problems due to manual testing are: (1) Fault identification is missing (2) increased number of test process (3) lot of quality issue araised from the customer side. To overcome the above problems the testing process is completely automated by automatic testing equipment.

II. LITERATURE SURVEY

[1]R.Sundarraj has described this system in order to reduce the man power.The embedded system is aimed to read the design parameters entered by the designer. The main problem in textile industry is that if the thread gets cut that will damage the fabric during working process. These damages are prevented by using PIC18F4620. This Microcontroller is interfaced with LCD, Shuttle sensor, warp sensor and relay[1].

[2]ShantharamNayakhas discussed about design of novel electronic jacquard with master slavearchitecture and design partitioning. An array of electro-magnets/ solenoids is used to build electronicjacquards. Electronic jacquard are the electronic version of widely prevalent mechanical jacquards, herethe design stored in the pen drive/SD card can be transferred on to the cloth electronically. In different parts of India, electronic jacquards were found working very much satisfactorily with much appreciation from the weaver, designer and manufacturer. This paper gives the study of computer controlled power looms and hand looms[2].

[3]P.Dhakshanamoorthi has discussed about power control and data log system. The main objective of this paper is to take data log from the motor and to control the electric power wastage. It is also used to check the performance of employee in industries. Basic Microcontroller 8051 is used in working of the system. This Microcontroller controls a motor and take data log at the time of looms running without yarn. The function of this PIC controller provides a design to clothes from stored integrated circuits(IC) and connected to microcontroller in weaving industries[3].
[4]Mr.M.Saravanan has discussed about Weaving loom monitoring and control system using IOT.Inexisting system PIC 16F877A Microcontroller are used. Because of using PIC Microcontroller if there is no internet connectivity and the speed of motor is not controlled. In the proposed system, the data sensor module will be collected and then these data will be transferred to the Raspberry pi module. These module act as a controller and it is also used to transfer the data to the cloud which can be viewedby the user with the help of internet[4].
[5]E.Prasanna Kumar has discussed about intelligent monitoring system for production management in power loom. Automation is the process to reduce the man power and the idea of an automationis to provide a test run in microcontroller based system. The proposed system is aimed to calculate the production units and running time of the machine binary digits and sendan information to the manager. The rpm is calculated when the machine gets run and running time and units are shown in the display for how many machine send SMS to the manager[5].

[6]Z.Reshma has discussed about IOT based cotton dust monitoring system in textile industry. Wi-Fi technology is used in this system to transmit the collected data over a wide range. In the existing system Zigbee technology is used to establish the wireless networking. In this system dust sensor detect the particles greater than 1 micron. The ceramic piezoelectric generator is used to power the system. The proposed system consists of optical dust sensor, DHT11 sensor, Arduino UNO. This system uses Wi-

IV. BLOCK DIAGRAM

Fi module to transmit collector sensor data to remote distance. This monitoring system used as a solution to overcome the problem of collection of data manually and also use the technology with shorter range[6].
[7]M.Saravanan has discussed about smart data monitoring ststem for power loom using IOT. This system mainly aims to collect the various data such as amount of cloth woven, labour details, weft and Warp defects. The proposed system consists of various sensor such as proximity sensor used to find any metal contact at the warp. Optical sensor is used to find the defect in weaving thread or pick. Reed sensor is used to calculate the amount of cloth woven. In this system power loom functions automatically with the help of raspberry as a controller. In this the sensed data from the loom will be displayed to the user in LCD as well as in the web server. In future manual assistance in beem replacement and warp breaks can be automated and multi looms can be controlled by the use of single controller[7].

III. EXISTING METHOD

In the existing system, in industry on load testing of data extension control board is done manually. Printing design is insert through SD card to the design inserting board.The design inserting board which convert the design into master data. The master data is passed to the data extension control board.To split the master data into 16 set of 8 bit serial data through data extension control board. Each 8 bit serial data passed to the magnetic module card. The magnetic module card convert the 8 bit serial data into 8 bit parallel data. Each magnetic module card having led at each bit. The data is checking bit by bit through led on and off. ON and OFF status of LED is checking one by one manually. Problems due to manual testing are fault indentification is missing, increased number of test process, increased manual error rate and lot of quality issues araises from the consumer side.

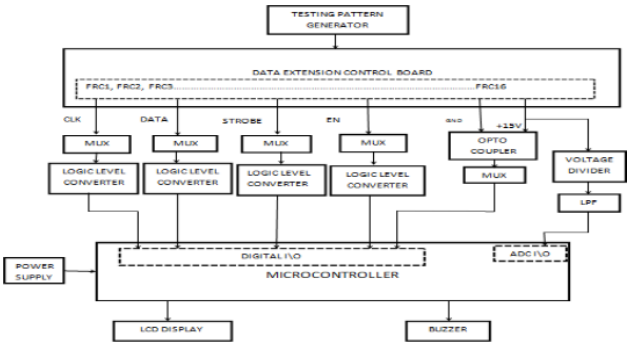

Fig.4.1.Block Diagram.

V. DESCRIPTION OF PROPOSED METHOD

The proposed system uses embedded based automation as a key component. This system consist of arduino mega 2560, multiplexer, logic level convertor, opto coupler, voltage divider, low pass filter, liquid crystal display and buzzer. Multiplexer is used for circuit reduction that is, it converts 16 FRC clock pulses into a single clock pulse to the logic level converter. Similarly it also convert data, strobe and enable. Then logic level converter takes +15V from the Multiplexer and it converts to the acceptance voltage (+5V) of microcontroller. The nominal voltage of data extension control board is +15V.So this voltage level also be tested by this automation. The signal from all the

logic level converter is fed to the digital I\O port of the microcontroller. Then the
+15V converted into the analog voltage (5V) through the voltage divider and is fed to the ADC I\O port of the Microcontroller. The output signal of the testing pattern generator and input signal of the microcontroller is compared by the microcontroller. If any mismatch of the signal it will be indicated by the buzzer and it will be displayed. Here Arduino at mega 2560 is used to automate the manual testing. In the proposed system, the details of clock pulse, data, strobe, nominal voltage, enable and ground are fed to the microcontroller (Arduino).If any problem araised from these parameters it will be displayed in LCD.Figure4.1 shows the block diagram of the proposed system.

1. Hardware Specification:

- Arduinoatmega 2560
- Multiplexer(HEF4067)
- Opto coupler(6N137)
- Logic level converter
- LCD(Liquid crystal display)

1. Arduinoatmega 2560:

ArduinoAtmega 2560 is a microcontroller board supported on ATmega 2560. It is physically large and it can be used as a different processor allowing greater program size and more.It consist of 54 digital I/O ports (which uses 15 PWMoutput ports) and 16 Analog I/O ports and 4 UARTs are used as a hardware serial ports. It is a 16MHz crystal oscillator. It has a Power jack, an ICSPheader and a reset button. It contains everything needed for the microcontroller. Its operating voltage range is 3.3V to 5V. Due to the requirement of more I/O pins arduinoatmega 2560 is preferred which is shown in the figure 5.1.1.

Fig.5.1. Arduinoatmega 2560.

2. Multiplexer(HEF4067)

It is a 16 channel analogue, it can act as multiplexer and demultiplexer with four address inputs,sixteen independent inputs/outputs (Y0 to Y15) .The devices contains sixteen bidirectional analogue switches each with one side connected to an independent input/output (Y0 to Y15) and another side to connected to the common input/output (Z). The analogue inputs/outputs can change between VDD as a positive limit and VSS as a negative limit. VDD to VSS may not exceed 15V. The figure 5.1.2 shows the multiplexer HEF4067.

Fig. 5.2.Multiplexer(HEF4067).

3. Opto coupler(6N137)

The opto coupler shown in the figure 5.1.3 (optical isolater or photocoupler) is an electronic component that transfer to electrical signals between two isolated circuits using light. It prevents the system from the high voltages. Opto coupler consist of LED and photosensor. The LED,which convert electrical energy into light energy that is transfer to photosensor,which is also convert light energy into electrical energy.Itconvert
+15V into acceptable voltage (+5V) of microcontroller.

Fig.5.3. Optocoupler (6N137).

4. Logic level converter

Logic level converter consist of reverse biased diode and pull up resister. Logic level converter convert the +15V into the acceptable voltage(+5V) of microcontroller. Reverse biased diode restrict the +15V and the pull up resister gives +5V to the microcontroller.

5. LCD(Liquid Crystal Display)

It is an electronic display module which uses liquid crystal. Which produce a visible image. The 16×2 display is displayed 16 characters per line in 2 such lines. Each character of the display is displayed in a 5×7 pixel matrix. Based on the condition of implemented in the arduino atmega 2560 the content will be displayed in the screen such as about working status. LCD display is shown in the figure 5.1.4.

Fig. 5.4. LCD.

VI.CIRCUIT DIAGRAM

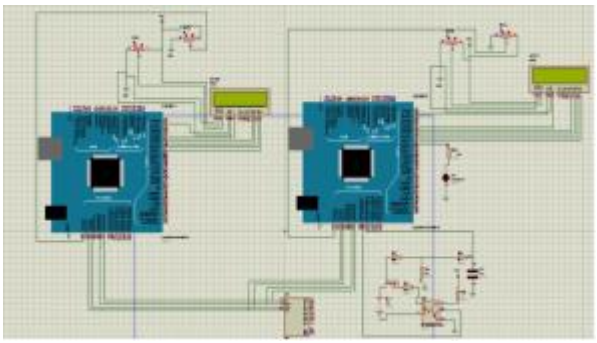

Fig.6.1: Circuit Diagram.

The above circuit diagram shown in the figure 5.1 depicts the simulation of the proposed system in PROTEOUS.The proposed system is implemented using arduinoatmega 2560.The software used for simulation outputs are PROTEOUS 8.1 and ARDUINO 1.8.8.

VII.OUTPUT

In the proposed system, the details of clock pulse, data, strobe, nominal voltage, enable and ground are fed to the microcontroller (Arduino). Microcontroller compares the testing pattern and resulting pattern.If any mismatch araised from these resulting pattern, it will be displayed in LCD and the buzzer will be on.

VIII. CONCLUSION AND FUTURE WORK

Thus the proposed system provides quality testing and indicates the defect in the resulting pattern(clock pulse and data),senses the nominal voltage, monitoring the strobe and enable signal details using Arduino Atmega 2560 and the data can be viewed by the user through display. Further, the quality of the tsting can be controlled in future by using IOT.

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