Power Loom Control using PIC18F4620

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Abstract

This paper proposes an the process to decrease the man power and the concept of an automation is to provide a simulation test in a microcontroller based system to be embedded in weaving machine for Monitoring and controlling the design operation. Power loom automation replace conventional mechanical methods as a forward step in embedded systems for industrial automation and mechatronics applications. The proposed embedded system aimed to read the design parameters entered by the designer using calculate the productions of loom, generate the design in sequences of binary digits and apply the design on the machine with machine status consideration. Peripheral Interface Controller (PIC) microcontroller, pin needle, Liquid Crystal Display (LCD), relays, sensors and switches are used for system programming in C language and Proteus electronics simulation environment.

Keywords - *PIC18F4620, relay, LCD, motor, shuttle sensor, weft sensor, proximity sensor.*

I. INTRODUCTION

The layers of warp yarn, and each pick of weft beaten up into the cloth after each (one after the other) passage of the shuttle across the fabric-making machine. Is cloth still to be woven this way during the next hundred years and after, or will some other method replace the history of weaving shows that man's clever genius has been working continuously on the problem of producing a woven fabric, and there are definite cycles during which certain ideas are reawakened and brought to the front and seen as something completely new. There are not enough weavers in the industry, and the in-take of new recruits is not enough. Wages in the fabric industry have changed a great deal since the war and this has increased the wages of the weaving (related to surgery). Manufacturers are getting a very much better price for the cloth which they produce, and although we are supposed to be approaching a (prices are low and there are a lot of things for sale), these prices will probably hold for some time. The chief results of these three reasons for increased interest are that it becomes very important for one (related to surgery) to pay attention to take care of more machines in order to maintain volume of output it is very important on account of higher wages that each worker agent should produce more fabric, and lastly, because cloth is selling at a better price, the manufacturer is in a better position to pay more for new machinery.

The major problem faced in textile industry is that the fabric gets damaged when the thread gets cut. This leads to produce damaged fabric which case unwanted production. The proposed system is designed in such a way that the machine is stop and prevented from damages. It uses PIC18F4620 as the main controlling unit. The LCD, Shuttle sensor, Warp sensor and Relay are interfaced with the microcontroller.

The shuttle sensor and warp sensor gives the status of thread condition and given to the microcontroller unit as input. The control unit shut down the machine through relay switching unit.

The shuttle and warp sensor status are displayed in the LCD screen and monitored message is also displayed on the screen.

II. PEER REVIEW

Now-a-days the use of textile fabric is prominent. Choosing the fabric according to the quality is a challenging task. Monitoring the weaving machine by the manual method is difficult if the unit of production machine count is high. (Wang lei et al - 2009). Control system based position and Power loom control is monitored. Using genetic techniques the Power loom is controlled.

Gorbunov Vladimir et al (2017) have describes the method of automated monitoring of weaving loom quality product. The density of the material produced is determined by the fabric structure. The vision system consists of a web camera and a micro-computer and allows to determine the geometric dimensions of the intervals between the basic yarns of the fabric. The management of these dimensions provides an opportunity to control the density of the manufactured fabric. The described system makes it possible to automate the quality control of the loom.

M. W. Burton and J.S. Culver (2015) have developing specialized carpet weaving machines. Brinton's machines are developed in-house because machines from other suppliers are not capable of meeting our requirements and are, in general, less technologically advanced. Brinton's have recently completed a prototype of a 5m wide face-to-face Wilton Loom which has been designed to increase productivity by up to 100% compared to the existing 12 ft. machine. This has required a radical change in

the design philosophy, both to allow the productivity improvement and to minimize machine tuning. Axes are powered by DC servo motors and are controlled using a Euro herm FMC controller.

Kunal Joardr and D. Raviv (1995) have proposed visual looming is related to an increased projected size of an object on a viewer's retina as the relative distance between the viewer and the object decreases. Psychologists have reported about subjects avoiding collision using this information by reacting defensively. In this paper we present a quantitative approach to visual looming and describe a novel method to measure this visual cue using visual fixation and studying the relative change in irradiance in the image. This visual cue can be used in the sense of a threat of collision for autonomous obstacle avoidance.

Michael bailey and van kuren (2002) Automation can be used to supplement the manual processing of used electronic products in order to offset the increasing volumes in electronic waste streams. The application of automation to demanufacturing requires high levels of flexibility. In order to study the utility of automation for demanufacturing of used products, a flexible cover removal process was implemented within an automated demanufacturing work cell. The process demonstrates two of the key objectives in automated processing of used products: feature identification and connection removal. The study is limited to threaded connections that can be detected on the external surface of the product. Feature detection is performed through the use of stereo machine vision with a simple search algorithm. Once a positive feature is discovered, a material removal approach is used to eliminate the threaded connections. A flexible material removal platform has been established with on hand tooling mounted to a 6 DOF industrial robot. Experiments identified key issues in the recognition and removal process. Constraints to the range of product that can be processed are identified based on feature recognition and material cutting limits. Product design considerations for automated demanufacturing are presented. Jürgen Freudenberger et al (2001) have proposed convolutional and block encoding schemes which are variations of woven codes with outer warp. We propose methods to evaluate the distance characteristics of the considered codes on the basis of the active distances of the component codes. With this analytical bounding technique, we derived lower bounds on the minimum (or free) distance of woven convolutional codes, woven block codes, serially concatenated codes, and woven turbo codes. Next, we show that the lower bound on the minimum distance can be improved if we use designed interleaving with unique permutation functions in each row of the warp of the woven encoder. Finally, with the help of simulations, we get upper bounds on the minimum distance for some particular codes and then investigate their performance in the Gaussian channel. Throughout this paper, we compare all considered encoding schemes by means of examples, which illustrate their distance properties. The above mentioned papers reveal about the concept of controlling the motor for various applications. In all the above mentioned papers only the shutdown of the machine is taken as a parameter to control the power loom machine which reduces the man power of the system and focused on the fabric. In the proposed system the main motor is shut down when thread gets cut, and monitor the fabric production. The proposed system uses PIC18F4620 as the controlling unit. Shuttle sensor is interfaced with the digital port of the controller which provides the status of thread in power loom machine. LCD is used to display the message.

III. HARDWARE DESCRIPTION

This project proposes an embedded system for Power loom Control. The proposed system mainly concentrates on monitoring the thread condition on both vertical and horizontal bunch of thread. Depending on the condition of thread in the power loom weaving machine get shut down. This chapter deals with the Block diagram of the project and details of each hardware component chosen in such a way that it suits best for the design of the proposed system.

A. Block Diagram

Figure 1 shows the block diagram of Power loom Control. PIC18F4620 is the main controlling unit of the proposed system. The shuttle sensor & warp sensor gets the vertical and horizontal cross thread status and is fed as input to the PIC microcontroller unit. The proximity sensor gets the quantity of fabric and is fed as digital input to the micro controller unit. LCD will display the status of thread and machine shutdown message. When reached the maximum quantity of fabric the proximity sensor giver output to the controller unit and shut down the machine by switched on the relay. When the shuttle sensor and warp sensor gives the output to the controller unit and shut down the machine.

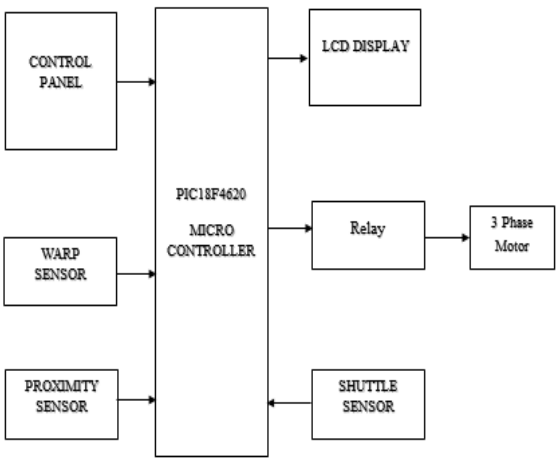

Fig. 1. Block Diagram

B. Schematic Diagram

This paper is to design a Pellet Amp Control where the ampere value of 75hp motor is continuously monitored to prevent the damage in the shafts.

This project is to design a Power loom Control where the thread condition and quantity of fabric are continuously monitored and shut down the machine to prevent the damage in the fabric.

The proposed system is developed with PIC18F4620 microcontroller. Liquid Crystal Display, shuttle sensor, Warp sensor, proximity sensor and relays are interfaced with the microcontroller unit. The shuttle sensor and warp sensor output is given to the microcontroller unit. Depending upon the thread status the relay units are switched ON.

LCD will display the thread condition and the status of machine. The proximity sensor gives the status of the quantity of fabric.

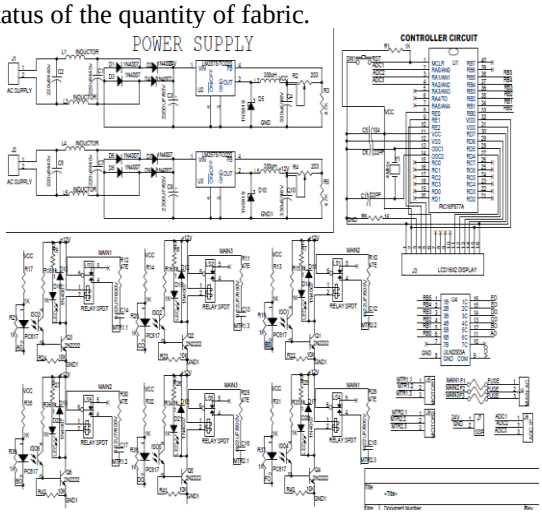

Fig. 2. Schematic Diagram

C. Implementation

The system is developed as mentioned in the schematic diagram shown in figure 2 The Power Loom Control has been designed with PIC18F4620. The coding is done on MPLAB software and is dumped into the PIC18F4620 kit.

Sensor's output are fed as input to microcontroller. PORTA pins as general purpose input and output pins. RA0-RA2 as input pins.

Three phase relay unit and Solid State relay are connected to PORTB pins as general purpose input and output pins through a relay driver. RB0-RC7 is set as output pins. The relay driver is ULN2003A which is connected with the PORTB pins.

LCD is interfaced with PORTD and PORTE of PIC microcontroller. All the data pins (D0-D7) are connected to RD0-RD7 and is configured as output pins. The reset and enable pins of LCD are connected to RE0 and RE2 respectively.

12V power supply unit supplies power to the relay circuit and 5V power supply is designed to feed power to the controller**.**

IV. EXPERIMENTAL RESULTS

A. Experimental Setup

Figure 3 shows the Experimental setup of this project. PIC18F4620 is the controlling unit in this project. The proximity sensor is interfaced with the microcontroller which is give the quantity of the fabric. According to the code, the system is processed.

When the shuttle sensor and warp sensor output is high value lies within the range one of the relays interfaced with the microcontroller is switched ON so that the motor drives the power loom machine.

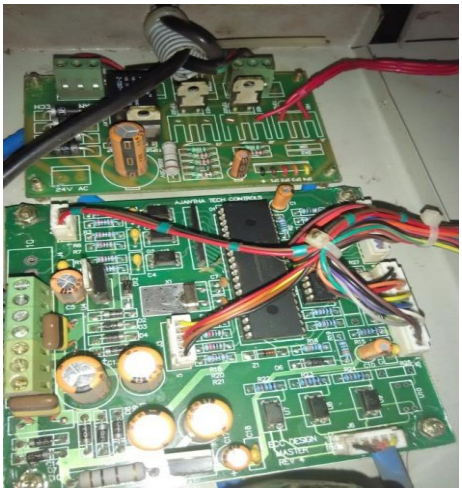

Fig. 3. Power loom Control

B. Result Analysis

. The simulation results are taken from the PROTUES software, these results are based on the inputs given to the microcontroller.

Normal Condition

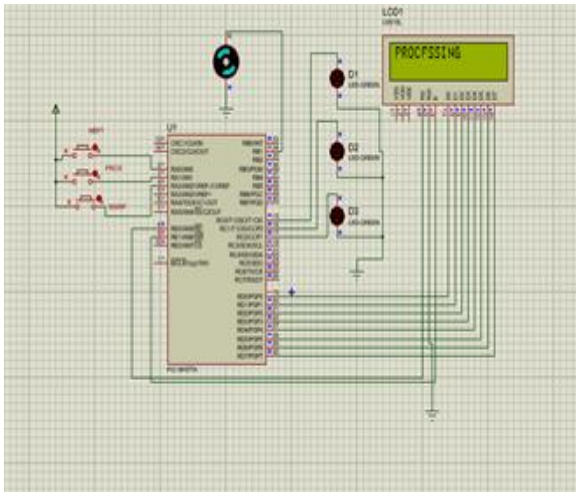

Figure 4 Processing of Machine.

Figure 4 shows the processing of machine which display a message, the machine is in normal processing condition.

Weft Sensor Output

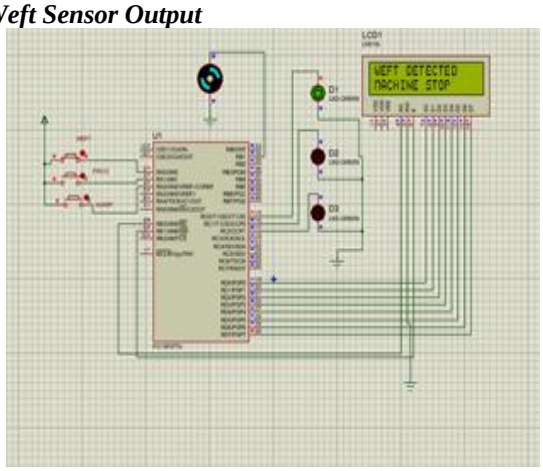

Figure 5 Weft Sensor Output.

Figure 5 shows the weft sensor output, if weft sensor status is high the power loom machine is shutdown.

Proximity Sensor Output

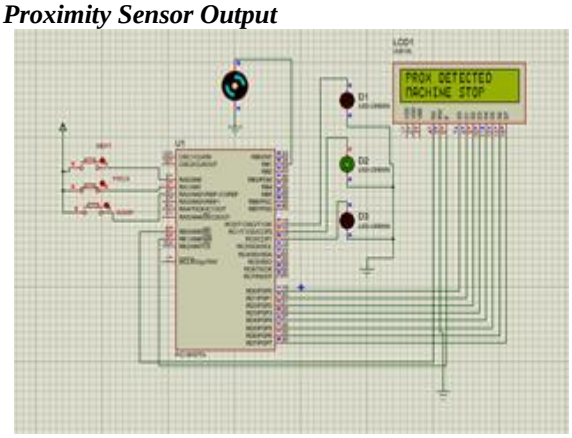

Figure 6 Proximity Sensor Output.

Figure 6 shows the proximity sensor output, if the fabric production quantity reaches the maximum, the power loom machine gets shut down.

Warp Sensor Output (Shuttle Sensor)

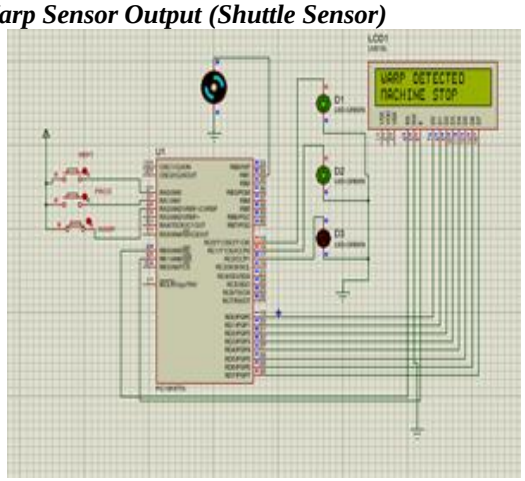

Figure 7 Shuttle Sensor Output

Figure 7 shows the Shuttle Sensor output, if weft sensor status is high the power loom machine is shutdown.

V. CONCLUSION

In this paper, The Machine gets stop when the thread is get cut and the thread is not available in the coil. This can be indicate by means of an LED light. It will display the production of loom continuously using proximity sensor. In future work will be IOT based power-stand near and threaten monitoring.

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