www.ijiarec.com

ISSN:2348-2079

Volume-6 Issue-2

International Journal of Intellectual Advancements and Research in Engineering Computations

Design and implementation of RTC for Textile Automation

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Abstract—In this paper,he method of automatic monitoring of weaving loom quality and time taken for as product. The density of the fabric made is set by the material structure. The vision system consists of an metal proximity and a micro-controller and permits to work out the geometric dimensions of the intervals between the essential yarns of the material. The management of those dimensions provides a chance to regulate the density of the factory-made material. The delineate system makes it doable to alter the standard management of the loom.

***Index Terms*—Arduino UNO, ATmega328 Micro controller, Metal Proximity, Warning LED'S.**

I. INTRODUCTION

The Weaving machines had numerous technological advances in recent decades. The development of on-line control systems and employing computer and digital processing lead to the generation of a higher level of automation in weaving machines. These progresses minimize fabric defect, reduce waste, increase productivity, eliminate the compensation process after fabric production and decrease labor cost. Despite applying developed systems on the weaving machine, many inspections during the weaving process, have still been carried out manually. Over the years, there have been many studies on the cause of irregularities in pickspacing and many efforts have been made to produce fabric with even pickspacing as well as remove starting marks. Greenwood et al. [1-3] have published a series of articles; in which theoretical and experimental work were combined to clarify affecting factors on pickspacing. They mentioned that cloth fell position and beat-up force effect on pickspacing. In another study, Greenwood and McLoughlin [4] developed a mechanical control system to eliminate the effect of fell position on fabric property.

They used negative sley driven mechanism in a shuttle loom. The sley was push toward the fell position by two springs. Sternheim et al. [5, 6] determined the effect of sley motion on beat-up force. They replaced the mechanically driven sley mechanism by a microprocessor controlled hydraulic driven sley. Eren and Porat [7] developed twoinput and two-output control system. Their results indicated that their control system could response well to the shift in cloth fell position and made the starting mark less visible. Jeddi et al. [8] and Ordoukhany [9] applied a PID control system and kept warp tension at constant value during the weaving process. This leads to increase in weaving machine efficiency and improve fabric quality. Dayik et al. [10] introduced gene expression programming to decrease the variation of warp tension during the weaving cycle. The results show that by applying this control system, warp yarn breaks were reduced. Nosraty et al. [11, 12] investigated effective parameters on weft yarn tension during the weft inserting process in a single nozzle air-jet weaving loom, with the aim of controlling weft yarn tension. Nozzle input air pressure and mechanical brake force were identified as two controllable parameters and designed a PID control system. Kuo et al. [13] developed a neural network control system aimed to identify the optimal angle for a beat-up mechanism. It led to improving the system transient response and eliminating the steady-state errors.

2. EXISTING SYSTEM

Most of the existing systems are manual system. The manual system needs labour for monitoring the production and quality. Considering labour's salary, the system will cost

much more than the automatic system, in which there is no assistance to the system. The weaver himself has to check the Loom weaving level of the fabrication and has to make judgment whether the error occurred. This way of inspecting the fabric quality level is not accurate and this drawback can be eliminated by using proximity sensor which is been used in our monitoring system.
Moreover, the quality required for the fabric to sustain, differs from loom to loom. If the error increases or decreases than the expected quality, it may affect the quality of the fabric. This problem can be overcome by using the monitoring mechanism, there by maintaining the desired quality of fabric.

3. SYSTEM DESIGN AND COMPONENTS

3.1 System Design

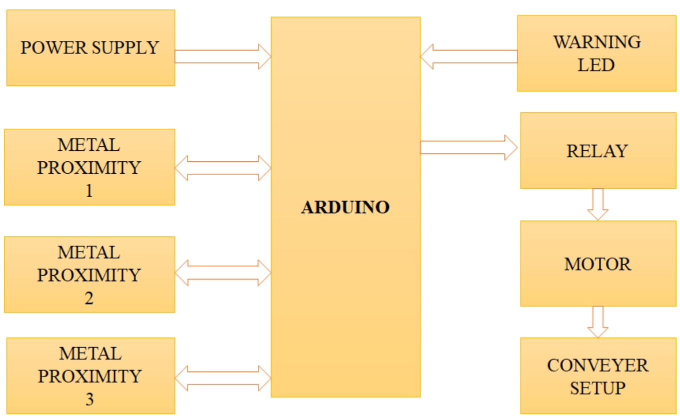


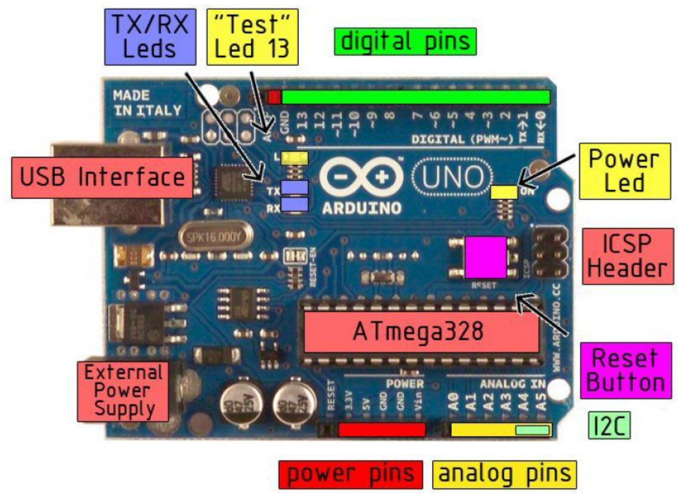
Fig. 1 Structure of the system

System *Working:*

The warp is the set of yarns or other elements stretched in place on a loom before the weft is introduced during the weaving process. It is regarded as the longitudinal set in a finished fabric with two or more sets of elements.[8] The term is also used for a set of yarns established before the interworking of weft yarns by some other method, such as finger manipulation, yielding wrapped or twined structures. Very simple looms use a spiral warp, in which the warp is made up of a single, very long yarn wound in a spiral pattern around a pair of sticks or beams.[9] The warp must be strong to be held under high tension during the weaving process. This requires the yarn used for warp ends[clarification needed] to be made of spun and plied fibre. Traditionally wool, linen, alpaca, and silk were used. However, improvements in spinning technology during the Industrial Revolution created cotton yarn of sufficient strength to be used in mechanized weaving. Later, artificial or man-made fibres such as nylonor rayon were employed. While most weaving is weft-faced, warp-faced textiles are created using densely arranged warp threads. In these the design is in the warp, requiring all colors to be decided upon and placed during the first part of the weaving process, which cannot be changed. Such limitations of color placement create weavings defined by length-wise stripes and vertical designs.

Many South American cultures, including the ancient Incas and Aymaras, employed backstrap weaving, which uses the weight of the weaver's body to control the tension of the loom.[10]

ARDUINO UNO Revision 3



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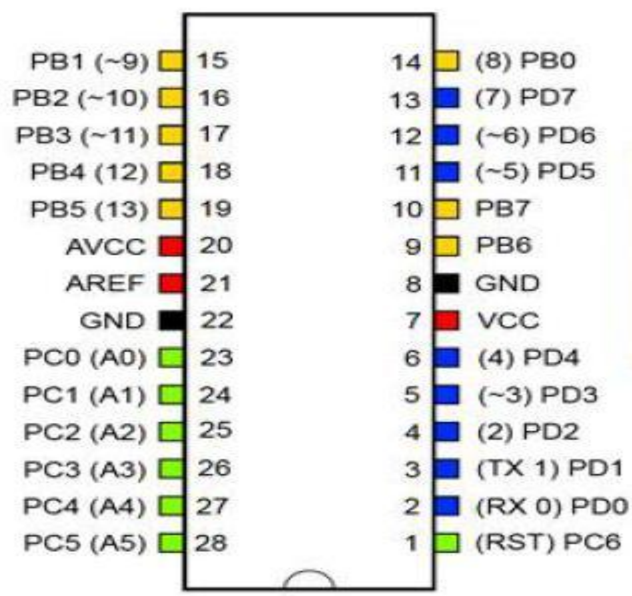
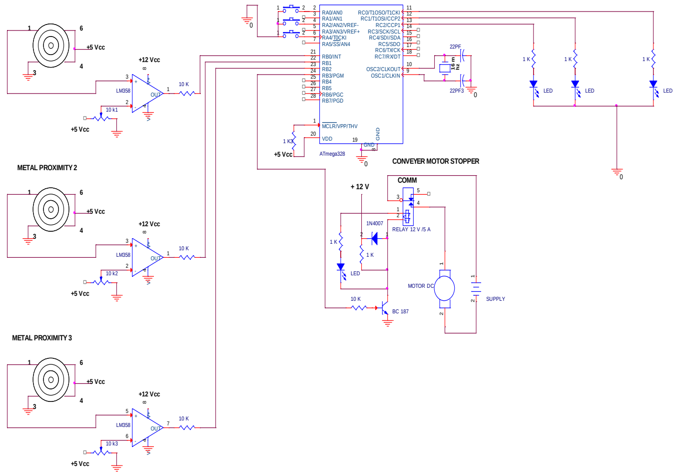
Pin Diagram for Processor Peripherals (Atmel ATmega 328)



CIRCUIT DIAGRAM:



3.2 Components

- **Power supply**
- **ARDUINO UNO Microcontroller Revision 3**
- **Relay Circuit**
- **DC-Motor**
- **Metal Proximity**
- **Warring LED**

A) Power supply:

The Available power source is an Ac voltage arrives at 230V.Since our electronic circuits require only very minimal voltage and current we use step down power transformer. Step down transformer is designed in such a way that the input is 230V and output of 12V. Another thing is that electronic circuits operate in DC where as available output of transformer is Ac of 12V. So rectifier circuit is used to convert AC to DC. Rectifier circuit consists of four diodes formed in bridge fashion so as to convert incoming AC to DC.

B) ARDUINO UNO Microcontroller Revision 3:

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter. "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards.

C) Relay Circuit:

Relays are electrically controlled switches. In the usual type, a coil pulls in an armature when sufficient coil current flows. Many varieties are available including "latching" and "stepping" relays; the later provided the cornerstone for telephone switching stations, and they're still popular in pinball machines. Relays are available for dc or ac excitation, and coil voltages from 5 volts up to 110 volts are common. "Mercury-wetted" are "reed" relays are intended for high-speed (~ 1ms) applications, and giant relays intended to switch thousands of amps are used by power companies. Many previous relay applications are now handled with Transistor or FET switches, and devices known, as solid-state relays are now available to handle ac switching applications. The primary uses of relays are in Remote switching and high-voltage (or high-current) switching. Because it is important to keep electronic circuits electrically isolated from the ac power line, relays are useful to switch ac power while keeping the control signals electrically isolated. The electrical relay offers a simple on / off switching action in response to a control signal. When a current flows through the coil of wire a magnetic field is produced. This pulls a movable arm, the armature, that forces the contacts to open are close; usually there are two sets of contacts with one being opened and the other closed by the action. This perhaps an electric heater in a temperature controls system.

D) DC-Motor:

A electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field. As you are well aware of from playing with magnets as a kid, opposite (North and South) polarities attract, while like polarities (North and North, South and South) repel. The internal configuration of a DC motor is designed to harness the magnetic interaction between a current-carrying conductor and an external magnetic field to generate rotational motion.

E) Metal Proximity:

A proximity sensor detects an object when the object approaches within the detection boundary of the sensor. Proximity sensors are used in various facets of manufacturing for detecting the approach of metal objects. Various types of proximity sensors are used for detecting the presence or absence of an object. The design of a proximity sensor can be based on a number of principles of operation, some examples include: variable reluctance, eddy current loss, saturated core, and Hall effect. Depending on the principle of operation, each type of sensor will have different performance levels for sensing different types of objects.

The Common types of non-contact proximity sensors include inductive proximity sensors, capacitive proximity sensors, ultrasonic proximity sensors, and photoelectric sensors. Hall-effect sensors detect a change in a polarity of a magnetic field. Variable reluctance sensors typically include a U-type core and coils wound around the core legs.

Inductive proximity sensors have a lossy resonant circuit (oscillator) at the input side whose loss resistance can be changed by the proximity of an electrically conductive medium. An electrical capacitance proximity sensor converts a variation in electrostatic capacitance between a detecting electrode and a ground electrode caused by approaching the nearby object into a variation in an oscillation frequency, transforms or linearizes the oscillation frequency into a direct current voltage, and compares the direct current voltage with a predetermined threshold value to detect the nearby object. Ultrasonic sensing systems provide a much more efficient and effective method of longer range detection.

These sensors require the use of a transducer to produce ultrasonic signals. Eddy-current proximity sensors are well known and operate on the principle that the impedance of an ac-excited electrical coil is subject to change as the coil is brought in close proximity to a metallic object. Proximity sensors often are employed in manufacturing industries in which the sensors are exposed to harsh environmental conditions. Inductive proximity sensors are used in automation engineering to define operating states in automating plants, production systems and process engineering plants. Magnetic proximity detectors are commonly used on ski lifts and tramways for detecting a derope condition of the steel cable used as a haul line or haul rope. Proximity sensors are widely used in the automotive industry to automate the control of power accessories.

For instance, proximity sensors are often used in power window controllers to detect the presence of obstructions in the window frame when the window pane is being directed to the closed position.

F) Warring LED

LED Stands for "Light-Emitting Diode." An LED is an electronic device that emits light when an electrical current is passed through it. Early LEDs produced only red light, but modern LEDs can produce several different colors, including red, green, and blue (RGB) light. Recent advances in LED technology have made it possible for LEDs to produce white light as well.

LEDs are commonly used for indicator lights (such as power on/off lights) on electronic devices. They also have several other applications, including electronic signs, clock displays, and flashlights. Since LEDs are energy efficient and have a long lifespan (often more than 100,000 hours), they have begun to replace traditional light bulbs in several areas. Some examples include street lights, the red lights on cars, and various types of decorative lighting. You can typically identify LEDs by a series of small lights that make up a larger display. For example, if you look closely at a street light, you can tell it is an LED light if each circle is comprised of a series of dots.

The energy efficient nature of LEDs allows them to produce brighter light than other types of bulbs while using less energy. For this reason, traditional flat screen LCD displays have started to be replaced by LED displays, which use LEDs for the backlight. LED TVs and computer monitors are typically brighter and thinner than their LCD counterparts.

CONCLUSION

An approach based on fourier transform has been described to detect the structural defect in fabric. The simulated models table iii difference in parameters obtained between a real fabric and its defect are used to understand the behavior of frequency spectrum. Since the three-dimensional frequency spectrum is very difficult to analyze and many defects occur along the horizontal and vertical axes, the central spatial frequency spectrum approach has been proposed to increase the efficiency of the analysis process. Seven significant characteristic parameters can be extracted from the central spatial frequency spectrums for describing the defect type. Experiments have shown that the extracted parameters can be used to classify fabric defects.

REFERENCES

[1] K. Srinivasan, P. H. Dastoor, P. Radhakrishnaiah, and S. Jayaraman, “FDAS: A knowledge-based framework for analysis of defects in woven textile structures,” J. Textile Inst., pt. 1, vol. 83, no. 3, pp. 431–1448, 1992.

[2] K. Schicktanz, “Automatic fault detection possibilities on nonwoven fabrics,” MelliandTextilberichte, vol. 74, pp. 294–295, 1993.

[3] X. F. Zhang and R. R. Bresee, “Fabric defect detection and classifiction using image analysis,” Textile Res. J., vol. 65, no. 1, pp. 1–9, 1995.

[4] J. S. Lane and S. C. Moure, “Textile fabric inspection system,” U.S. Patent 5 774 177, 1998. [5] C. Ciamberlini, F. Francini, P. Sansoni, and B. Tiribilli, “Defect detection in textured materials by optical filtering with structured detectors and self-adaptable masks,” Opt. Eng., vol. 35, no. 3, pp. 838–844, 1996.

[6] C. Castellini, F. Francini, G. Longobardi, and B. Tiribilli, “On-line textile quality control using optical Fourier transforms,” Opt. Lasers Eng., vol. 24, pp. 19–32, 1996.

[7] C. Ciamberlini, F. Francini, G. Longobardi, P. Poggi, P. Sansoni, and B. Tiribilli, “Weaving defect detection by Fourier imaging,” Vis. Syst. Applicat. SPIE, vol. 2786, pp. 9–18, 1996.

[8] E. J. Wood, “Applying Fourier and associated transforms to pattern characterization in textiles,” Textile Res. J., vol. 60, pp. 212–220, 1990.

[9] S. A. H. Ravandi and K. Toriumi, “Fourier transform analysis of plain weave fabric appearance,” Textile Res. J., vol. 65, no. 11, pp. 676–683, 1995.

[10] J. Escofet, M. S. Millan, H. Abril, and E. Torrecilla, “Inspection of fabric resistance to abrasion by fouries analysis,” Proc. SPIE, vol. 3490, pp. 207–210, 1998.

[11] H. Sari-Saraf and J. S. Goddard, “On-line optical measurement and monitoring of yarn density in woven fabrics,” Automat. Opt. Inspect. Ind. SPIE, vol. 2899, pp. 444–452, 1996.

[12] R. C. Gonzalez and R. E. Woods, “Image transforms,” in Digital Image Processing. Reading, MA: Addison-Wesley, 1993, ch. 3, pp. 81–128.

[13] R. C. Gonzalez and R. E. Woods, “Image enchancement,” in Digital Image Processing. Reading, MA: Addison-Wesley, 1993, ch. 4, pp. 166–189.

[14] MATLAB User’s Guide, The MathWorks Inc., Natick, MA, Aug. 1992

[15] T.Jayakumar, P.Uvaraj, P.Krishnagandhi, “A Review of Multilevel Selective Harmonic Elimination Techniques” International Journal of Emerging Technologies in Engineering Research (IJETER) Volume 4, Issue 7, July (2016) pp.55-57

[16] T.Jayakumar, B.Ramraj, V.Arunkumar “Adaptive Learning and Control of Steam Turbine Brushless Excitation System Using Neuro Fuzzy” International Journal of Emerging Technologies in Engineering Research (IJETER) Volume 4, Issue 7, July (2016) pp.58-67

[17]T.Jayakumar, M.Prabu, .Tamilselvan “Analysis of Non-Invasive Pulse Oximetry with Single Light Source Using Fourier series And Soft Computing Techniques” International Journal of Emerging Technologies in Engineering Research (IJETER) Volume 4, Issue 7, July (2016) pp.68-72

[18] P. Vignesh, T. Jayakumar, “DSP Based Wireless Reflectance Pulse Oximeter for Photoplethysmograms” International Journal of Science and Research (IJSR), vol. 3 Issue 11, November 2014, pp.534 – 537.

[19] T. Jayakumar, “Automation on PLC Furnace System Using Labview” International Journal of Electronics & Communication Technology, IJECT Vol. 4, Issue 1, Jan - March 2013, pp. 317 – 320.

[20] P. Vignesh, T. Jayakumar, “Implementation Of An Automatic Defribillator For Cardiac Patients” International Journal of Advanced and Innovative Research (2278-7844) / # 206 / Volume 4 Issue 2, pp. 206 – 209.

[21] Karthic P.T, T.Jayakumar , K.Tamilselvan, “ Feautre Extraction For Human Identifiction using Finger And Palm Images” International Journal Of Technology & Engineering Research (IJOTER) Volume (4), Issue (1), January - June-2016 (e) 0980-9589 (p) 0980-9589x

[22] K.Tamilselvan, R.Krishnaraj, P.Sukumar, T.Jayakumar, “Security Method for Human Finger and Palm Images Identification” International Journal of Emerging Technologies in Engineering Research (IJETER) Volume 4, Issue 6, June (2016) pp. 77 -80