

Power Loom Automation Using PIC Microcontroller to Avoid Warp Error and Detection of Thread in Weft

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ABSTRACT: In this paper, a Novel method to Automate shuttled power looms is proposed. Power loom is a mechanized loom, mainly meant for the purpose of weaving in textile industries. It considerably reduces human labor and wastage. Hence it helps to ensure high quality cloth production, monitoring and measurement. It provides automatic warp and weft error detection and automatic weft replenishment. This module uses PIC16F877A to provide the necessary automation of the shuttled power looms, with immediate termination of its motor operation in case of any weft or warp errors. Peripheral Interface Controller (PIC) microcontroller, pin needle, Liquid Crystal Display (LCD) and switches are used for system programming in C language and Proteus electronics simulation environment.

KEYWORDS: Weft, Warp, Single and Double pick, PIC16F877A, Switches, LCD, Motor, Shuttle, Led light.

I. INTRODUCTION

Power loom is a mechanized loom used for weaving yarns in textile industry. It uses a drive shaft for power and became a key development in industrialization of textile industry during early industrial revolution. Invented by Edmund Cartwright in Great Britain, in 1784, power looms made the process of weaving and creating textiles much quicker than with the hand driven looms. This made the power loom to become one of the defining machines in the industrial revolution. This tool was further refined after 47 years by Ken worthy and Bullough, a design which was partially automatic. In 1895, many looms driven by electric engine were invented and in the beginning of 1930s, each individual machine was driven by an electric motor. There are two types of power looms: shuttle and shuttleless power looms. In this paper, automation of shuttled power loom is proposed. The terms warp and weft are two key terms used in the process of weaving. In literal sense, they are the technical terms for the two types of thread used to weave a cloth. The warp is the tightly stretched lengthwise core of fabric, while the weft is woven between the warp threads to create various patterns. Sometimes weft is also called as the „filler“ thread, since it fills in the desired design and also as “woof” in some regions. The huge components of the loom are the warp beam, heddles, harnesses, shuttle, reed and take-up roll. In the loom, yarn processing includes shedding, picking, battening and taking-up operations. Shedding is the process of raising the warp yarns to form a loop, through the weft yarns.

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. To become fully automatic, loom requires immediate stop motion if any warp or weft yarns break. The proposed system is designed in such a way that the machine is stop and prevented from damages. It uses PIC16F877A as the main controlling unit. The LCD are interfaced with the microcontroller. The shuttle and warp status are displayed in the LCD screen.

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II. RELATED WORK

EXISTING SYSTEM:

The existing system for the automation of the power looms, was established many years ago. This system, though, it has many advantages, it suffers from serious drawbacks also. In this, IC 555 timer is used to control the entire automation of such a huge mechanized looms. In this system, IC 555 timer provides the necessary automation. The warp and weft errors are detected and multiplexed to a signal generator, whose output is given to the timer IC. Since IC 555 has only a single input, multiplexing multiple inputs become a tedious job. Automated Power loom using op-amp in the same areas, the 555IC is also equally reliable and is cheap in cost. Apart from its applications as a monostablemultivibrator and astablemultivibrator, a 555 timer can also be used in dc-dc converters, digital logic probes, waveform generators, analog frequency meters and tachometers. Because from the existing process the new process has been developed. The new process is to overcome the drawbacks of an automated power loom using IC555. The drawback is that the IC555 have a minimum number of pins so can't able to control the maximum process.

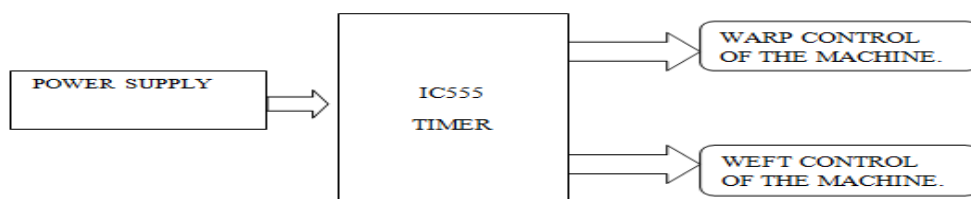


FIG. 1. BLOCK DIAGRAM OF EXISTING SYSTEM

III. PROPOSED SYSTEM

In this paper, a PIC based automation circuit for shuttle looms, that facilitates automatic weft and warp stop motion is proposed. Also it provides automatic weft replenishment and has a warning system. It is a cost efficient and an intelligent system for automating the shuttle looms. This has tremendously decreased the required man power and also ensures high quality woven fabric. The hardware consists of Microcontroller unit, Input unit (Warp error, Weft error, Weft replenishment) and Output unit (motor unit, LCD display, LED). The block diagram of the proposed model is given in fig.2. All the above units interact with each other to provide necessary automation of shuttled power looms, which includes automatic error detection and weft yarn replenishment.

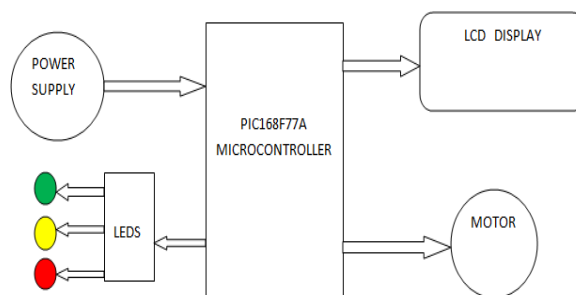


FIG.2. BLOCK DIAGRAM OF PROPOSED SYSTEM

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MICROCONTROLLER UNIT (PIC 16F877A)

Peripheral Interface Controller or Programmable Interrupt Controller a family of modified Harvard architecture microcontrollers made by Microchip Technology. It is a 40 pin IC and has an inbuilt 10 bit, 8 channel analog to digital converter. It exhibits high performance RISC CPU, only with 35 instructions. All single cycle instructions except for branches, which are two cycles. It has an operating speed of: DC-20 MHz clock input and DC-200 nanoseconds instruction cycle. It has a FLASH program memory of 8K x 14 words, up to 368 x 8 bytes of Data Memory (RAM) and up to 256 x 8 bytes of EEPROM Data Memory.

LED:

A light-emitting diode (LED) is a two-lead semiconductor light source. It is a p-n junction remain somewhat more expensive, and require more precise current and heat management, than compact fluorescent lamp sources of comparable output. In the proposed system, there are three types of an led lights were used namely ,RED, GREEN and YELLOW.

MOTOR:

A motor is an electrical machine which converts electrical energy into mechanical energy. The principle of working of a DC motor is that "whenever a current carrying conductor is placed in a magnetic field, it experiences a mechanical force". The direction of this force is given by Fleming's left hand rule and it's magnitude is given by $F = BIL$. Where, B = magnetic flux density, I = current and L = length of the conductor within the magnetic field.

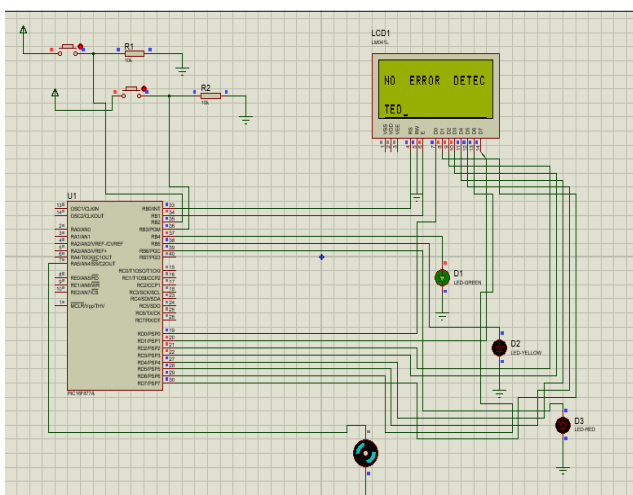
LCD DISPLAY:

A liquid crystal display is a special thin flat panel that can let light go through it, or can block the light. (Unlike an LED it does not produce its own light). The panel is made up of several blocks, and each block can be in any shape. Each block is filled with liquid crystals that can be made clear or solid, by changing the electric current to that block. Liquid crystal displays are often abbreviated LCDs.

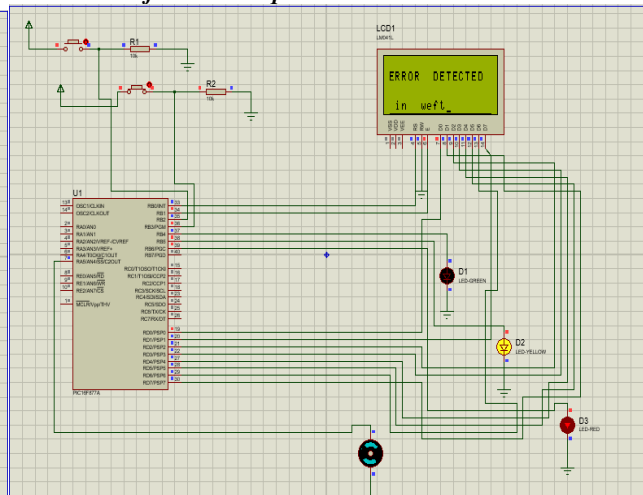
IV. RESULT ANALYSIS

The Power Loom Control has been designed with PIC16F877A. The coding is done on MPLAB software and is dumped into the PIC16F877A kit. The simulation results are taken from the PROTUES software, these results are based on the inputs given to the microcontroller.

Normal Condition



Weft error Output



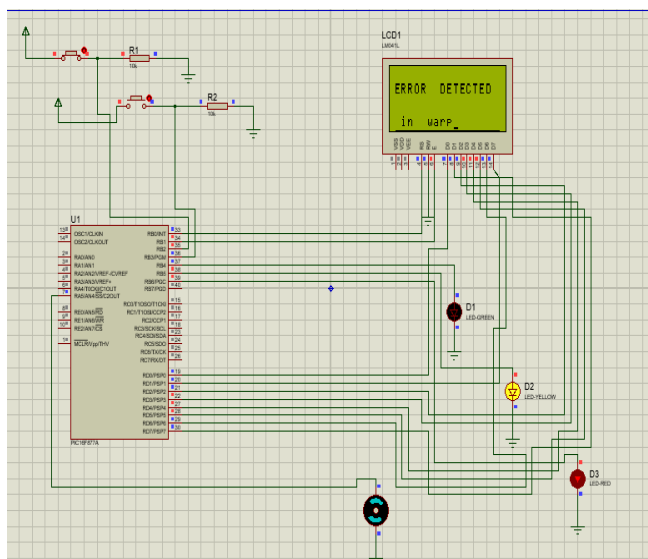
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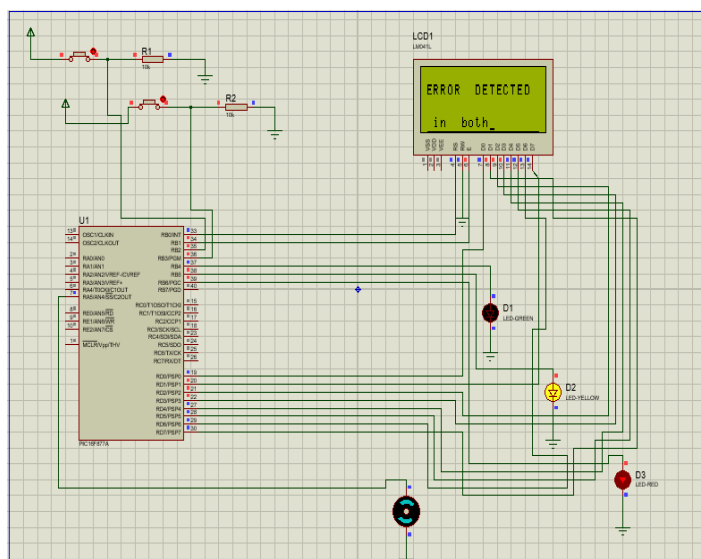
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Warp error Output



Weft and warp error Output



V. CONCLUSION

In this paper, we proposed a method for automatic warp and weft error detection and automatic weft replenishment and provide the necessary automation of the shuttled power looms, with immediate termination of its motor operation in case of any weft or warp errors monitoring the power loom functions automatically with the help of PIC microcontroller. In future, to indicate the replacement of shuttle in weft, IR sensor and IR led's are used to detect the completion of bobbins. The proximity sensor in the device indicates the position of the shuttle in the weft. Global System for Mobile(GSM) is also installed to alert the operator and superior about the error through the mobile network.

REFERENCES

- [1] P. Balasubramani, R. Krishnaveni, "PIC Based Power Loom Automation Using IOT", INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH VOLUME 8, ISSUE 10, OCTOBER 2019.
- [2] Ms.S.Sharmila,A.Imran, T.Karthick, R.SaravanaPandi,A.Sriprabhu, "AUTOMATION POWER LOOM SYSTEM",International Journal of Advanced Research in Biology Engineering Science and Technology (IJARBEST) Vol. 2, Special Issue 10, March 2016.
- [3] Sundarraj R, Mr.AArunraja, "Power Loom Control using PIC18F4620", SSRG International Journal of Electronics and Communication Engineering (SSRG - IJECE) – Special Issue ICETST Nov 2018.
- [4] M. Saravanan, M. Jagadesh, V. Deepan, R. Divya, S. GowriManohari," Smart Data Monitoring System for Power Loom Using IOT", International Journal of Pure and Applied Mathematics Volume 119 No. 10 2018.
- [5] P. DhakshinaMoorthi and BoselinPrabhu S.R., Power Control and Data Log System Design in Loom Industry Using Controller,American Journal of Computer Science and Engineering Survey, AJCSES[3][1][2015].
- [6] TawalePranali V., PawarTriveni T., PatilTejaswini M., Mr.B.P.Kulkarni, " Loom Automation and Monitoring System", INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH IN TECHNOLOGY, IJIRT, Volume 4 Issue 11, April 2018.
- [7] E.PrasannaKumar ,P.Karuppusamy , D.Santhosh Kumar , C.Sowndharsekar , S.Venugopal, "Intelligent Monitoring System for Production Management in Powerloom", International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering, Vol. 6, Issue 3, March 2017.
- [8]AtiehAlmasiZefrehyee, Mohammad Amani Tehran, PhD, HooshangNorsaty, PhD, MarzieAbhajani, PhD," On-line Loom Weft Density Control System Design", Journal of Engineered Fibers and Fabrics, Volume 10, Issue 4 – 2015.
- [9] Jin H Lee, Ph.D., Abdelfattah Mohamed Seyam, Ph.D., George Hodge, Ph.D., William Oxenham, Ph.D.,"Warp Breaks Detection in Jacquard Weaving Using MEMS: Effect of Weave on Break Signals", Journal of Engineered Fibers and Fabrics, Volume 3, Issue 1 – 2008.
- [10] MarcinKopaczka, Marco Saggiomo, Moritz Güttler, Thomas Gries and DoritMerhof, Fully Automatic Faulty Weft Thread Detection using a Camera Systemand Feature-based Pattern Recognition, 7th International Conference on Pattern Recognition Applications and Methods , ICPRAM 2018.