REVIEW ON LOOM AUTOMATION AND MONITORING SYSTEM

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Abstract:-

A loom is a device used to weave cloth and tapestry. The basic purpose of any loom is to hold the warp threads under tension so that the interweaving of the weft threads can be done. A power loom is a mechanized loom powered by a line shaft and alcohol. Power Loom played a key role in developments of weaving industries during the early Industrial Revolution. There are number problems that affect the quality of loom. This includes problems like empty bobbin, weft cut etc. and to solve these problems many methodologies have been proposed. In this article we have tried to review the various available techniques as far as loom automation is concerned .We have tried to focus on the methodologies used and on the basis of the review carried out we propose to develop a weft end detection techniques based on microcontroller which will be useful in determining the end of the weft before it finishes off and thus would help in quick replacement of the weft thereby saving a lot of crucial time leading to improvement in efficiency of the system.

Key words:- **Loom Automation, Data Transmission (Bluetooth, Wi-Fi), Intelligent Monitoring, Laser Based Feature Detection, Convolution code, Adaptive Slicing Method**

Introduction:-

The history of weaving shows that men have been continuously working on problems which occur during production in textiles and through these many inventive techniques have been brought into account to reduce these problems. There are not enough weavers in the industries, and the in- take of new recruits is insufficient. Wages in the textile industry have altered a great deal since the war and this has increased the wages of the weaving operative. Manufacturers are obtaining a very much' better price for the cloth which they produce, and, although we are supposed to be approaching a buyer's market, these prices will probably hold for some time. The chief results of these three reasons for increased interest are that it becomes essential for one operator to handle more number of machines at the same time in order to maintain proper volume of output it is essential on account of higher wages that each operator 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. For rapid industrialization, it is necessary to

concentrate more on small scale industries. As a result the basic problems like unemployment, shortage of foreign exchange and paucity of capital will be made more noticeable or prominent. Under such circumstances, small scale industries are undoubtedly better suited, since they are labour intensive and capital saving.

Literature Survey:-

Kunal Joarder and Daniel Raviv have proposed that the concept of visual looming can be used as a powerful tool for autonomous obstacle avoidance. They have also proposed the concept of avoiding collision and to calculate the thread hence the 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. Mark. Hassel has proposed that the concept of the thread detection including the feature detection system. Jurgen Freudenberg, Martin Bossert, Victor V. Zyablov, and Sergo Shavgulidze have proposed that the variations of the woven codes of outer warp can be done by means of a convolution codes and block code.[11]

Below table shows some references proposed to solve various problems which occur in automatic loom:-

Sr. No.	Topic	Author`s	Conclusion
1.	Automation Power Loom System	Ms.S.Sharmila, A.Imran, T.Karthick, R.Saravana Pandi, A.Sriprabhu	The Monitoring and controlling the design operation of a microcontroller based weaving system can be done with help of automation. Automation Replaces the old conventional methods and takes a step forward towards mechatronics and automation applications.
2.	Loom Data Monitoring using Wireless Technology	M. H. Shenassa	Data transmission using wireless technology can be done with use of Bluetooth Or Wi-Fi technology. Data Transmission is quite often necessary in industries to transmit time-critical control signals between sensors, actuators and the automation network.[9]
3.	Intelligent Monitoring	E.Prasanna Kumar,	For proper management the system should always be under the surveillance

	System for Production Management in Power loom	P.Karuppusamy, D.Santhosh Kumar, C.Sowndharsekar, S.Venugopal	of the manager. This can be done with the use of intelligent monitoring system where the information related to production and running time of machine is send to the manager through which the system can be properly managed.
4.	Automated de-manufacturing studies in detecting and destroying, threaded connections for processing electronic waste	Michael Bailey-Van Kuren	With the help of automated de manufacturing the electronic waste can be detected and destroyed automatically. Feature detection is performed through the use of stereo machine vision with a simple search algorithm.[6]
5.	The development of a new adaptive slicing algorithm for layered manufacturing system.	Jyh Hwa Tzou, R.C. Luo, Yi Cheng Chang	According to this algorithm, the 3D CAD model can be sliced with different thickness automatically by comparing the contour circumference or the centre of gravity of the contour with those of the adjacent layer. Thus we can conclude that the fabrication in adaptive slicing method can requires less time than fabrication through uniform slicing method.
6.	Laser based feature detection system including internal thread detection	M. Hassel	Laser-based inspection to check the presence of threads can be done by presenting the components to the inspection system on a moving conveyor belt. As the component passes the laser inspection station, if threads are present, laser light is scattered back from the threads and into a laser detector. If no thread is present, the laser light continues on its path, and will reflect off the component at its normal incident angle.[3]

7.	Woven codes with outer warp: variations, design, and distance properties	Jurgen Freudenberger, Martin Bossert, Victor V.Zyablov, Sergo Shavgulidze	With the help of the lower limits of the analytical delimitation technique at the minimum distance of the convolutional codes of the fabric, interlaced block codes, series chained codes and interlaced turbo codes can be derived. With the help of simulations, it is possible to derive the upper limits of the minimum distance for some particular codes.[4]
8.	A Numerical Model of the weft yarn filling insertion process in rapier looms	Fabio Previdi, Sergio M. Savaresi	This method is used for predicting weft yarn breakage and to design tension control systems by weft braking action. Each element can interact only with the nearest neighbours by a viscoelastic interaction. The resulting model has lumped parameters and it is completely described by a set of ordinary differential equations.[8]

We have tried to focus on the methodologies used and on the basis of the review carried out we propose to develop a weft end detection techniques based on microcontroller which will be useful in determining the end of the weft before it finishes off and thus would help in quick replacement of the weft thereby saving a lot of crucial time leading to improvement in efficiency of the system.

Conclusion:-

Thus we conclude that we have been able to carry out the review of various techniques which have been implemented for loom automation and weft cut detection. On the basis of literature survey we also conclude that there is a need to develop a technique base on microcontroller which can detect the weft cut automatically thereby helping to improve the efficiency of the system

References:-

[1] Kunal Joarder and Daniel Raviv, Robotics Centre and Department of Electrical Engineering, Florida Atlantic University, Boca Ram, Florida 33431; " A New Method to Calculate Looming for Autonomous Obstacle Avoidance" 1994 IEEE.[11]

[2] Kunal Joarder and Daniel Raviv, The Electrical Engineering Department and The Robotics Centre Florida Atlantic University, Boa Raton, FX 33431, and National Institute of Standards and Technology "A Novel Method to Calculate Looming Cue for Threat of Collision" 1995 IEEE.[11]

 [3] Mark. Hassel, Arial Laser Electronics, England "Laser Based Feature Detection System Including Internal Thread Detection" IEEE2006. 2016 IJARBEST.[11]

 [4] Jurgen Freudenberger, Martin Bossert, Victor V. Zyablov, and Sergo Shavgulidze "Woven Codes with Outer Warp: Variations, Design, and Distance Properties" IEEE journal on selected areas in communication, MAY 2001.[11]

 [5] Ren C. Luo, Jyh Hwa Tzou and Yi Cheng Chang Intelligent Automation Laboratory Department of Electrical Engineering, NCCU 160 Shang-Shing, Ming-Hsiung, Chia-Yi, Taiwan 621, "The Integration of 3D Digitizing and LCD Panel Display Based Rapid Prototyping System for Manufacturing Automation" 2000 IEEE.[11]

 [6] Michael Bailey-Van Kuren Department of Manufacturing Engineering, Miami University "Automated De-manufacturing Studies in Detecting and Destroying Threaded Connections for Processing Electronic Waste" 2002 IEEE.[11]

 [7] Hitoshi Kametani, Junya Shiratsuki' 'Department of Control Engineering MNCT, Matsue, Japan "Noncontact Measurement of the Quantity of Remained Thread of a Sewing Machine Used in the Factory" August 2003.[11]

[8] Fabio Previdi, Sergio M. Savaresi, Member, IEEE, and Corrado Volpi "A Numerical Model of the Weft Yarn Filling Insertion Process in Rapier Looms" USA, June , 2006.[11]

[9] M. H. Shenassa K.N.Toosi University of technology Department of Control Engineering "Loom Data Monitoring Using Wireless Technology" 2006 IEEE.[11]

[10] GUANG-LI LIU, LU YANG ,College of Information and Electrical Engineering, CAU, Beijing 100083, China "Uncertainty Loom For Early-Warning".[11]

[11] Triveni Pawar, tawale pranali, patil tejaswini, B.P.Kulkarni, PVPIT, Budhgaon "Loom Automation And Monitoring System", ijirt, 2017.