WEAVING LOOM MONITORING AND CONTROL SYSTEM USING IOT

Mr.M.Saravanan[1],

Deepan.V[2], Divya.R [3], Gowri Manohari.S[4], Gowrishankar.S[5]

[1]*Assistant Professor,*[2,3,4,5]*UG Students, Department of Electronics and Communication Engineering,*

SNS College of Technology, Coimbatore

ABSTRACT

Automation is the process to reduce the man power and the idea of automation is to provide a test run in a microcontroller based system to monitor and control the production operation. A power loom is a mechanized loom powered by a line shaft and is one of the key developments in the industrialization of weaving. The main goal of today's looms is to achieve maximum efficiency with high production so that a system comes into picture for achieving optimum quality and maximum production with certain features and configuration. In the proposed system, the production quantity, the production time, labor details , shift status ,pick count and sensor status can be gathered using various sensors and the gathered data will be sent to the microcontroller(Raspberry pi).These collected data can be monitored using IOT . The sensors used are proximity sensor, reed sensor, optical sensor and current sensor.

Keywords: IOT, Loom monitoring, Microcontroller, Optical sensor, Reed sensor

I. INTRODUCTION

1.1.Weaving process

Weaving is the process of interfacing two set of threads together at right angles such that they form a unified fabric. The two sets are defined as the warp and weft and within each set the threads lie parallel to one another. During the weaving process the warp is defined as the set being held stationary, while the weft is the set being introduced to the warp.

"Loom data interpretation system" is an "Automated Information System" which will give better control over production monitoring and take corrective steps immediately. Loom data system provides better control over quality and production of the loom is that it will improve the productivity of the organization. The key to a profitable and successful weaving loom is the management of the loom to ensure it is achieving maximum efficiency. Productivity is assured by the continuous performance of every single loom in the mill. The idea of having a system that will provide a real time view of the loom gives birth to loom data system. In order to make textile factory achieve the lean and agile production, an automatic collection system for textile production is

presented in this paper. It establishes a platform for monitoring machines and collecting information from the machines in real time which realizes timely feedback information about machine malfunctions. It is necessary to do proper analysis of data. The purpose of analyzing data is to obtain usable and useful information. The analyzes irrespective of whether the data is qualitative or quantitative, may :(i)describe and summarize the data (ii)identify relationships between variables (iii)compare variables (iv)identify difference between variables (v)forecast outcomes.

II. EXISTING SYSTEM

In the existing system, PIC 16F877A is used as a microcontroller. This system is used for checking whether the rotation is available in the motor or not, to calculate the number of units and run time of machine, to display the production of stand near and threaten because of the above three process, there will not cause loss for the production of the fabric making machine, to send the details to the manager through SMS.
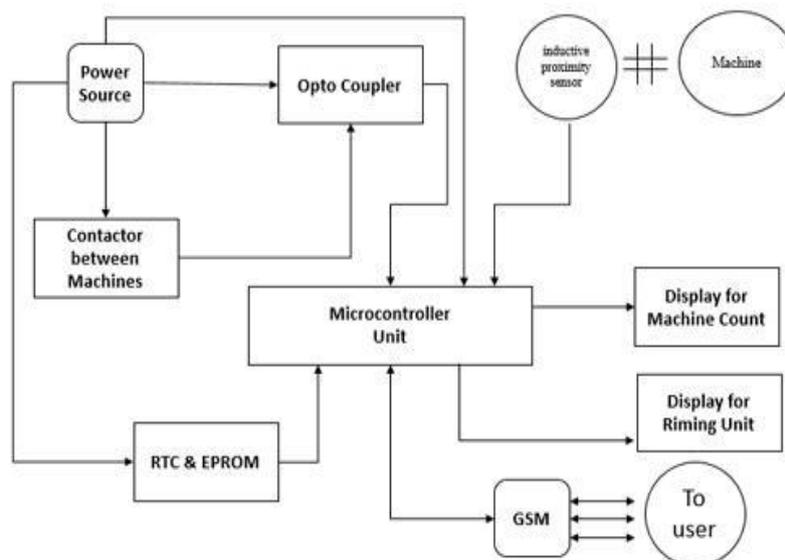
Fig.2.1 Block Diagram

In the existing system, there is no internet connectivity due to the use of PIC microcontroller. There is no automatic indication in the existing system if the thread reached the end limit or if there is any breakage in the thread. The speed of the motor is not controlled in the existing system. These discrepancies are overcome in the proposed system.

III. PROPOSED SYSTEM

The main modules of the proposed system are

- Sensor module
- Microcontroller module
- User module

3.1. Sensor Module

3.1.1. Optical sensor

Fig.3.1.Optical Sensor

An optical sensor converts light rays to electronic signal. The purpose of optical sensor is to measure the physical quantity of light and then translate it into a form that is readable by an integrated measuring device. In the proposed system, the use of optical sensor is to monitor the warping process.

3.1.2. Proximity sensor

Fig.3.2.Proximity Sensor

A Proximity sensor is a sensor able to detect the presence of nearby objects without any physical contact. A proximity sensor often emits an electromagnetic field or a beam of electromagnetic radiation and looks for changes in the field or return signal. The object is referred to as proximity sensor's target. The use of proximity sensor in the proposed system is to detect the metal.

3.1.3. Reed sensor

Fig.3.3.Reed Sensor

Reed sensor is a kind of passive electronic switching structure which contacts with a simple structure, small size and easy to control. It consists of a simple glass sealed envelope where there are two ferrous elastic reeds and filled with inert gas called rhodium. Normally the two reeds are separated in the envelope. It is used for finding the speed of the motor.

3.1.3.Current sensor

Current sensor is a device that detects electric current(AC or DC) in a wire, and generates a signal proportional to that current. The generated signal could be analog voltage or current or even a digital output.

3.1.4.Variable Frequency Drive(VFD)

A VFD also termed as adjustable frequency drive is a type of adjustable speed drive used in electro-mechanical drive systems to control AC motor speed and torque by varying motor input frequency and voltage. A VFD is a device used in a drive system consisting of the following three subsystems-AC motor, main drive controller assembly and drive or operator interface.
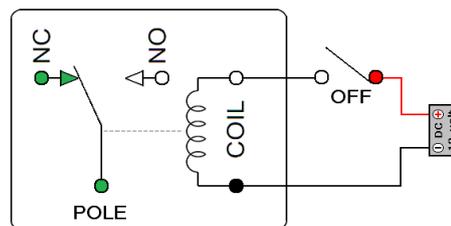
3.1.5.Relay

Fig.3.4 Relay

Relays are simple switches which are operated both electrically and mechanically. Relays consist of an electro-magnet and also a set of contacts. The switching machine is carried with a help of an electromagnet. The main operation of a relay comes in places where only a low power signal can be used to control a circuit. It is also used in places where only one signal can be used to control a lot of circuits.

3.2.Microcontroller Module


Fig 3.5 Raspberry Pi 3

Raspberry pi is a series of small single board computers. CPU speed ranges from 700 MHz to 1.2 GHz for the Pi 3 and on board memory range from 256 MB to 1 GB RAM. SD cards are used to store the operating system and program memory in either SDHC or MicroSDHC sizes. Several USB slots are available for both audio and video output. Lower level output is provided by a number of GPIO pins which support common protocols like I^2C. It has inbuilt WiFi module. It uses python programming .The Raspberry pi module is used as a controller in the proposed system which can be used for transferring the data from the loom to the server.

3.3.User Module

The collected data from the power loom will be transferred from the Raspberry pi module to the web server. IoT is introduced in the proposed system by use of Raspberry Pi. The user can able to monitor the working process through the web server.

IV. WORKING PRINCIPLE OF PROPOSED SYSTEM

The block diagram of the proposed system is shown in fig IV.1. The data from sensors module will be collected and then these collected data will be transferred to the Raspberry pi module. The raspberry pi acts as a controller and is also used to transfer the data to the cloud and it can be viewed by the user with the help of web server.
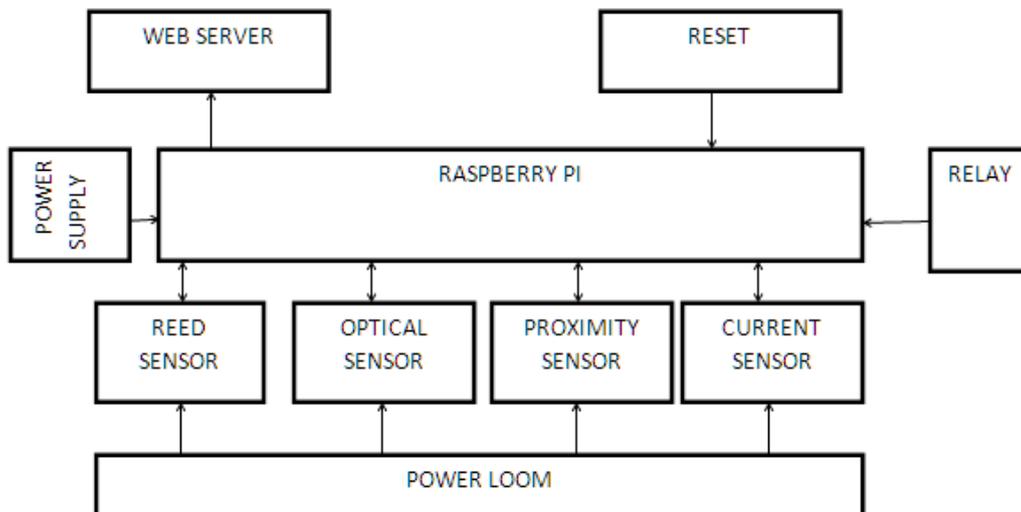
Fig.4.1 Block Diagram of Proposed System

V. CONCLUSION AND FUTURE WORK

Thus the proposed system provides production quantity and indicates the defect in the thread, sensor status, labour details and pick count using Raspberry pi and the data can be viewed by the user through internet. Further, the quality of the loom can be controlled in future by using vision system. The vision system consists of web camera which is used to determine the geometrical dimensions of the intervals between the basic yarns of the fabric.

REFERENCES

[1] Fabio Previdi, Sergio M.Sarvaresi, "A Numerical Model of The Weft Yarn Filling Insertion Process in Rapier Looms", 2006.

[2] GUANG-LI LIU, LU YANG, "Uncertainity Loom for Early-Warning", 2006.

[3] Kumar.S.Lai TH. & Balogh J. 'On k-coverage in a mostly sleeping sensor network' , Proc of the 10ᵗʰ Annual Int'l Conf. on Mobile Computing And Networking, Philadelhia, acm,2004,pp.144-158.

[4] Kunal Joarder and Daniel,R Aviv " A New method to calculate Looming Cue for the Threat of Collision", 1995.

[5] Noor M.A.Rabiser R, Grunbacher P. Agile product line line planning: A collaborative approach and a case study[J]. Journal of Systems.

[6] H.Sari-Sarraf and J.S.Goddard, Jr., "Online optical measurement and monitoring of yarn density in woven fabrics," Proc.SPIE, VOL.2899, pp.444-452,Oct.1996.

[7] D.Schneider, T.Holtemann, and D.Merhoff, "A traverse inspection system for high precision visual on-loom fabric defect detection," Mach Vis.Appl.,vol.38, no.6, pp.1585-1599, 2014.

[8] J.F.Shao and L.S. Qin, "Design of loom monitoring and management system based on C/S model," J.Textile Research(in Chinese), vol.27, no.7, pp.75-78, 2006.

[9] A.Vaidya, Globalisation: Encyclopaedia of Trade, Labor, and Politics.Santa Barbara, CA, USA: ABC,2005.

[10] C.P.Xie, X.F. Wang and B.J.Xu, "Textile production management system based on Client/Server," Cotton Textile Technology(in Chinese),vol.30, no.6,pp.352-354,2002.