Implementation of IOT Based Power Loom Automation System

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Abstract - **Automation is the process to reduce the man power and the idea of automation is to provide a test run in an Atmega328p microcontroller-based system to monitor and control the production operation. The main objective of this project is to control the electric power wastage and take data logs from a motor and also to check the performance of an employee in industries. This system works on Atmega328p microcontroller so it requires low cost and gives efficient performance in unnecessary electric power wastage in power loom motors. All the system is designed on basis of Atmega328p microcontroller, proximity sensor and RFID. The system includes IoT design to observe worker performance online from anywhere in the world.**

Keywords: IoT, Internet of things, Power loom automation, Automation system, Electric power wastage, Loom, Atmega328p microcontroller, DC Motor, RFID, and Relay.

I. INTRODUCTION

Power loom is one of the machines used for textile production in most small scale industries. Industry has become the second largest employment generating sector in the world. Data interpretation system is an Automated Information System which gives better control over production monitoring and takes corrective steps immediately. It provides better control over quality and production. It calculates how much work done by worker on that machine and store the Continuous performance of every single worker in a mill gives a high productivity. With its increasing growth and demand, textile industry faces many problems is the use of automation in textile industries. Automation can be defined as the process of reducing human assistance in the process performed. In most sectors of textile manufacturing, automation is one of the major key to quality improvement and cost competitiveness. Processes that have been automated require less human intervention and less human tier to develop. A process control or automation system is used to automatically control industry. The process automation system uses a network to interconnect sensors, controllers, operator terminal and actuators.

The textile industry mainly deals with the design and production of yarn, cloth and their distributions. Power loom is one of the machines used for textile production in most small-scale industries. Power loom is motorized loom powered by a line shaft. In most sectors of textile manufacturing, automation is one of the major key to quality improvement and cost competitiveness. Processes that have been automated require less human intervention and less human tier to develop. A process control or automation system is used to automatically control industry. The textile industry mainly deals with the design and production of yarn, cloth, and their distributions. Power loom is one of the machines used for textile production in most small-scale industry. Industry has become the second largest employment generating sector in the world. Data interpretation system is an Automated Information System which gives better control over production monitoring and takes corrective steps immediately. It provides better control over working process of employee.

II. PROBLEM STATEMENT

In this Industry some problems are occurs such as they are measuring the length of cloth manually as well as marking system on the cloth also manually and how much cloth gained then decide on this salary of each workers in this industry many workers are working in this field suppose one workers complete the task 6 hours then similarly second worker same task continuously work. And also measuring process are very lengthily manpower required is very high in this system so I have design a new automation power loom system in textile industry which is fully automatic to reduce human efforts, time and money so we can design an automatic system which measure the length the cloth automatically while production is going on

III. OBJECTIVES

The objective of our project is to reduce human efforts; it means to develop automation in existing machine-like power loom:

1. Now the power looms are manual in recording the data are available, so we are making system to make it automatic.
2. Use of identity card (RFID) to keep all the information about the worker or employee.
3. The measurement of cloth on power loom is manual which takes extra time, money, so we can be implementing an automatic system which measure the length of cloth automatically while production going on.
4. In current scenario, in the power loom daily work done is calculated later while measuring the cloth and it's totally manual, but due to this system we can calculate the work done easily day to day and it added to the specific account.
5. After all this, all information about work done by the worker or employee is directly sent on his or her mobile through text message. Due to this system the owner doesn't need to pay extra man power payment and it's too easy to make calculation about salary of employee.
6. Due to IoT based system all the database of worker and status of machine can be accessed live from anywhere in the world.

IV. ANALYTICAL TREATMENT

The IoT-based Power Loom Automation System integrates sensors, microcontrollers, communication networks, and cloud platforms to optimize loom operations. Sensors monitor parameters like tension, speed, and energy consumption, while microcontrollers control the loom based on sensor inputs. Data is transmitted via wireless networks to the cloud, where real-time data processing occurs. Analytics are applied to the collected data, using descriptive, predictive, and prescriptive techniques to monitor performance, predict maintenance needs, and suggest operational adjustments. Edge computing ensures low-latency actions at the loom level. The system automates workflows through real-time alerts for anomalies and actuators that make automatic adjustments. Predictive analytics triggers maintenance alerts, preventing unexpected breakdowns. Energy consumption is tracked and optimized through data analysis, allowing for efficient power usage and cost savings. Quality control is maintained through real-time monitoring and defect detection, ensuring consistent fabric quality. Predictive maintenance, enabled by IoT data, minimizes downtime by predicting failures, compared to preventive maintenance, which operates on a fixed schedule. The system's cost-benefit analysis shows initial implementation costs are offset by long-term savings in energy, downtime reduction, and operational efficiency, leading to a strong return on investment. The system is scalable and flexible, making it adaptable to different production needs in the textile industry.

V. IMPLEMENTATION

The system comprises Atmega328p microcontroller, inductive proximity sensor, RFID reader, relay, GSM module and LCD display. The wheel mechanism is used to measure the length of cloth produced by the weaving loom. It is placed on a roll on which the produced cloth is wound. As the cloth produces, it wound on a roll and it rotates the wheel placed on it. The inductive proximity sensor is used to measure the rotation of wheel. Its output is given to Atmega328P microcontroller. Atmega328P microcontroller calculates the length of cloth from the rotation of wheel. The measured cloth length is displayed on LCD. RFID reader is used to identify the worker. The RFID card is given to each worker. Worker shows the card to RFID. So, the system identifies the worker and produced cloth is added to that particular workers account. It will help to calculate the cloth produced by each worker and give the salary according to that. Relay is used to turn ON and OFF the loom. It is connected to loom motor. Whenever the worker shows his card then and then only the loom is started. In the last when we press the switch then the text SMS will sends to the worker mobile number through GSM.
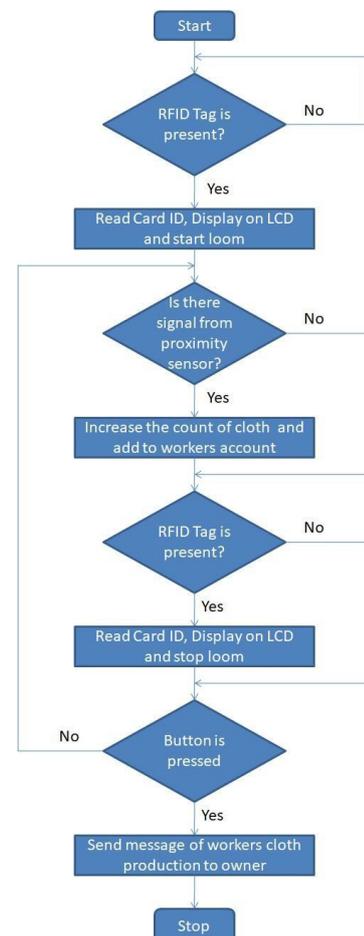
Flowchart

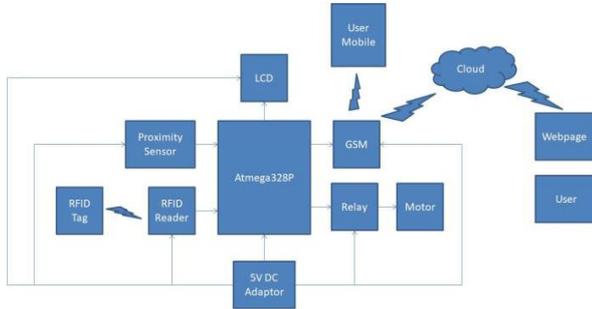**Figure 1: Flow chart**

Block Diagram

Figure 2: Block diagram

VI. RESULT

Sr. No	Diameter of Wheel	Rotation of Wheel	Cloth produced in (cm)	Cloth produced in (m)
1.	10cm	10times	100cm	1meter
2.	20cm	10times	200cm	2meter
3.	30cm	10times	300cm	3meter
4.	40cm	10times	400cm	4meter
5.	50cm	10times	500cm	5meter

Example:

Where 10cm is diameter of wheel,

If, wheel rotated 10times then cloth produced is 100cm.

Production= 100cm

$= 100*10^2$

= 1meter

VII. CONCLUSION

In this paper, we proposed a method of monitoring the power loom function automatically with the help of AVR microcontroller. AVR microcontroller is one of the advanced controllers used now-a-days. It will display the production of loom continuously using proximity sensor. The future work will send message of loom production through GSM to the manager and worker. Proposed system can be used in small scale power looms where owner of small scale industry cannot afford the cost of autolooms.

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