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IOTBASED PRODUCTIVITY MONITORING ANDCONTROL SYSTEM FOR TEXTILE INDUSTRY

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ABSTRACT

Today, globalization and more stringent requirements push managers to optimize all systems involved in their organizations and in particular the operations processes which have great impact on productivity. In this scenario, concepts as availability and time to repair play a key role for achieving the desired Key Performance Indicators. To this end, the advanced of communication technologies can support practitioners in managing more efficiently production processes using advanced approaches to plant / machine monitoring. Lab VIEW systems can support operations activities (mainly production activities) and allow operators to monitor and control the entire production process. This project presents a IOT based applications for monitoring and controlling the textile machineries. The solution allows operators to constantly monitor operating state and real-time data of machineries in order to prevent machine failures or handle them as soon as possible. At the same time, data are collected and stored in a server in order to extract information and make historical analysis about productivity and efficiency, using analytics approaches.

INTRODUCTION

The Indian small scale textile production has a major impact on the world economy through millenniums. At present fabric inspection depends on human sight, the result of inspection influenced by the physical and mental condition of inspector. Now, all the textile industries aim to produce good quality fabrics with high production rate. In the textile sector, there are huge losses due to manual calculations in the production side. In recent years, PC-based control technology has become a widely used industry practice. Benefits include faster design cycles, lower downtime using diagnostics and simulation tools, increased productivity and decreased maintenance costs. Moreover, open system designs that use standard hardware and operating system software minimize cost, permit system scalability, and ensure future performance enhancement.

The main objective is to use embedded computers and networks to monitoring and control the physical processes. Here sensors capture data from objects or processes and send them to the control algorithm. This new kind of systems has also the possibility to hugely impact on maintenance activities and this project can be used at its higher level as it will provide the basic design guidelines for the one who wants to implement it on an industry level.

Automation Using IT: ERP systems are widely being used in the textile industry for managing the Inventory, Orders, Production, Logistics, Sales and Marketing and Financials etc. Many generic ERP solutions as well as customized ERP solutions are available for textile industry [9]. ERP solution helps in integrating the operational

processes and establishes synergies between various resources of the textile industries. Automated Systems are also being developed for the effective communication between the production floor and other supervisory control systems. Now a day, operating and process related data is being captured from the machines and is being analyzed in various BI software for the operations analysis and further productivity improvement. BI reports are being published for the top management and are used for various decision making processes.

Effects of Automation: Automation brings in quality and also improves the productivity in the mills and garment industry. Productivity increase because of automation has resulted in reduction in the overall manpower in the textile industry.

LITERATURE SURVEY

Dissipation of accumulated static electricity on protective clothing is still a concern of researchers. Thus the development of new fabrics involves further analysis. In this paper are performed measurements and an analysis of the results for 12 textile samples. The measurements of charge decay were performed in accordance with SR EN 1139-3 -2006 Test method 2 induction charging. The experimental measurements and the results concerning the dissipative electric charge of knitted fabrics with different compositions and structures are presented taking into account the following considerations:- Electrical parameters measured and calculated: electrical capacity, voltage and calculation of electric charge, strength of electric field Evaluation parameters: charge decay time and protective coefficients as decisive factors in using of knitted fabrics like protective clothing [1]. This paper discusses the implementation of quality management systems (Six Sigma) along with ISO in the textile industry of India. The literature indicates that Indian companies are falling far behind in comparison to their international competitors in the area of competitiveness like timely delivery, consistency, reliability, innovation and quality. Adoption of quality management systems with ISO can help the organisations to improve competitiveness and performance. In this study data is collected from twenty six textile companies which are member of The Textile Association India (TAI), located in Solapur district, Maharashtra. The findings indicate that only ISO 9000 Quality Management System is widely adopted by the sample companies whereas the other model like Six Sigma is not given importance [2]. Many of the Textile industry fall under SME(small medium enterprise). In recent times, this industry faces many challenges every day to survive its business from global competition. Some of those challenges are poor facility layout, poor workplace conditions; to name a few. It is imperative that the production facility of these industries should be lean to compete with not only with local market but also global market. This paper focuses on reducing the cycle time of the T-shirt production. For this, various lean tools such as value stream mapping, kaizen, failure mode effect analysis, time and motion study are used. The outcome of this study is 20% reduction in cycle times, which resultant 1,50,000 INR saving [3]. This paper employs a perspective of company behaviour to analyze the China textile industry shift. In order to maximize profits, international buyers procure products in the global textile network. The sourcing strategy affects behaviours of enterprises in the supply chain. Questionnaire surveys and interviews are conducted to figure out the influence factors of the international buyers' sourcing strategy. It appears that "cost" is the most important factors. Furthermore,

several external indicators such as "political environment", "import procedures and channels" etc., are vital in selecting the original countries. Regarding to the selection of suppliers, "price", "quality" and "quick response and lead time" are regarded as the key determinants. The competitiveness of Chinese suppliers is also proposed in the paper [4]. Paper presents a practical solution to improve power factor in a textile plant substation using a power factor controller with six capacitors banks. A wireless signalling installation was developed to display the capacitor banks connection to the substation's grid. The power factor controller was implemented into practice. Experimental measurements were made with a power quality analyzer operating in three cases: one case without regulator and other two cases with regulator (one with an unexpected fault in the system and one without fault). It was found that the use of six capacitors banks with the same large value is not the right solution to obtain a fine adjustment of reactive power in low voltage electric grid [6].

EXISTING SYSTEM

Process of Existing System: The process which is actually taking place in this industry is stated below:

- The monitoring system consists in three components Looms, the machines monitored and supervised.

- They dispose of a Internet module, by means of which they can communicate over TCP/IP and through a proprietary protocol with other IP entities.

- Looms, through a polling policy, communicate their current (e.g. motor RPM, warp tension, weft density etc.) and, eventually, the occurred faults. SCADA Server, whose main tasks are collect data, store them into a database and provide information to clients.

- Periodically SCADA Server interrogates at are reachable through their IP address information received are then stored into a relational database management system (RDBMS).

- The RDBMS chosen for this application is MySQL, as SCADA Server acts also as Web server: Web server provide its clients with Web services through the use of the Hypertext Transfer For this purpose, an Apache HTTP Server has been adopted, with PHP server-side Clients requests are received by the service server which in return gives the client an answer in JavaScript Object Notation (JSON) format through the use of the HTTP protocol.

- On SCADA Server also resides an application with the task to periodically interrogate looms in order to acquire real time data of machines. This application accesses Server database to acquire looms information such as IP addresses and communication parameters. Clients, typically in the form of PCs, tablets or smartphones, show to human operator the desired information, accordingly to operator permissions.These systems are connected to server by HTTP protocol,over IP.

- Textile machines are controlled and monitored using PLC and SCADA. Only production is monitored using the existing method and the industry shift timings are noted manually.Such architectures can be seen as complex networks of simple links.

PROPOSED SYSTEM

* By analyzing the difficulties faced by the workers in this industry, we have preferred the controlling purpose in an automated approach using Programmable Interface Controller.* Many times, a close supervision

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of the processes cause high fatigue on operator resulting in loss of track of process control.* This can be greatly reduced by implementing such an automated concept. To monitor the production output, shift timing and labors details instead of PLC we use PIC microcontroller. * By using Lab VIEW is used for monitoring and controlling purpose and we can monitor more than 10 machines simultaneously.

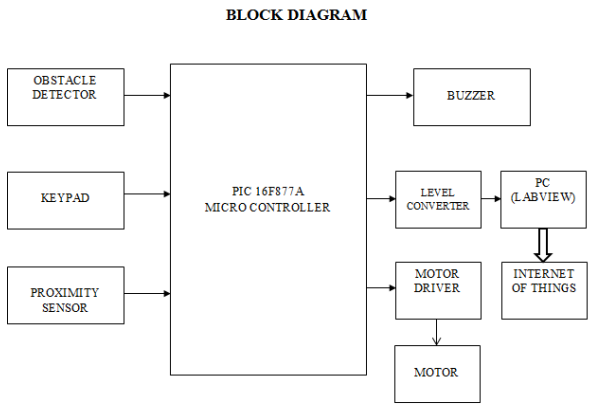

Fig 1: Block Diagram for Proposed System

By implementing the project in the textile industry, the following advantages can be obtained:

1. Hazardous effects faced by the workers facing in the industries are reduced.
2. The human errors can be rectified
3. It is very cost effective.
4. It can be controlled and monitored at the same time.
5. Compactable and highly efficient.

The proposed block diagram of productivity monitoring and control system for textile industry. In this block diagram. It consists of the main controller as PIC which is given input through obstacle detector, keypad and sensors and the output devices like buzzer, motor and PC with labview. In this the obstacle detector IR sensor is used. It detects infrared radiation to sense its surroundings. Its frequency range is higher than microwave and less than visible light and the keypad which provides a visual way to get numeric data to control system. It contains a series of pushbuttons to provide structured input for measuring user input. The proximity sensor detects an object without touching it, and they therefore do not cause abrasion or damage to the object. The output buzzer gives alarm when our given target is reached. Then the motor gives power to MCU to do physical works and it control easily with micro controllers then we can use it in all directions it can also control its speed finally by using IoT and LABVIEW software we can control it globally and store all those in the personal computer.

RESULTS AND DISCUSSION

In LABVIEW software we can control it globally and store all those in the personal computer. To monitor the production output, shift timing and labors details instead of PLC we use PIC microcontroller.

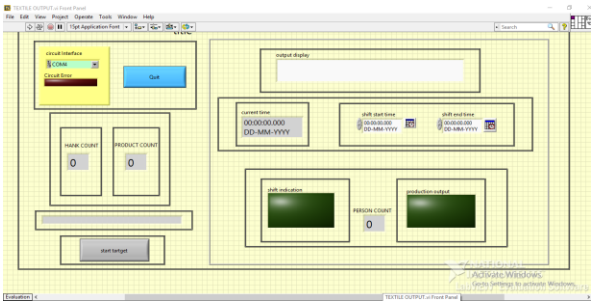

Fig 2: Overview of Lab VIEW

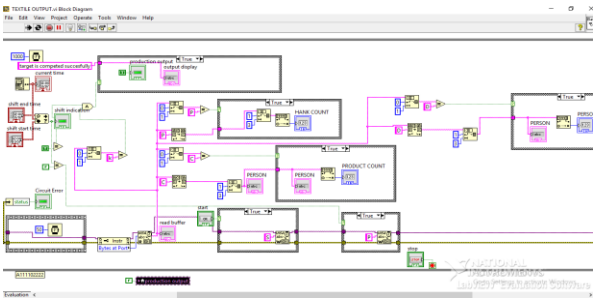

Fig 3: Simulation Output

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CONCLUSION AND FUTURE WORK

This project prevents the design and implementation of embedded system using Lab VIEW platform for small scale textile industries. The embedded and PIC microcontroller provides centralized monitoring and supervisory control of the process. The Lab VIEW as a programming software offers flexibility in design and time consuming. The advantage of this process include increasing the rate of production and decreasing the man power. Moreover, by using IOT concept we can control it in anywhere in future and will be of great value by implementing such as embedded based control system.

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