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# DESIGN AND IMPLEMENTATION OF IOT BASED MODERN WEAVING LOOM MONITORING SYSTEM

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## ABSTRACT

This paper proposes an the process to decrease the man power and the concept of an automation is to provide a simulation test in a microcontroller based system to be embedded in weaving machine for monitoring operation. Power loom automation replace conventional mechanical methods as a forward step in embedded systems for industrial automation and mechatronics applications. The proposed embedded system aimed to read the design parameters entered by the designer using calculate the voltage, current, RPM, cloth quality and power of loom. The hardware used in proposed work is Liquid Crystal Display (LCD), current sensor, voltage sensor, Arduino microcontroller, IoT module and ultrasonic sensor.

**KEYWORDS:**

IR sensor, current sensor, voltage sensor, ultrasonic sensor, power loom, IoT module

## INTRODUCTION

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 use of man power in the industry can be reduced with the help of automation. The main goal of industry is to achieve maximum efficiency with high productivity. This can be achieved with the help of this system.

This proposed work provides automation to power loom. The monitoring report consists of input voltage, input current and motor RPM. This is also display when the cloth is defected. Actually it is the server; we can able get the data from anywhere. This server has user ID and password. IoT monitoring also enables you to bridge the gap between devices and business by collecting and analyzing diverse IoT data at web-scale across connected devices, customers and applications.

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## PROPOSED BLOCK DIAGRAM

The hardware used in proposed work is Liquid Crystal Display (LCD), current sensor, voltage sensor, Arduino microcontroller, IoT module and ultrasonic sensor. The microcontroller used in the proposed system is Arduino microcontroller. It is a series of small single board computer with CPU ranging from 700 MHz to 1.2 GHz. It has an on board memory ranging from 256 MB to 1 GB RAM. Ultrasonic sensor is used to detect the faults in cloth.IR sensor is used to count the rpm of motor. Current sensor is used for measuring current. To transmit the data which is collected from loom is transmitted through IoT module. Voltage is measured through

**Fig 1 Block diagram**

Voltage sensor and LCD Display used to display the cloth defect information and motor information. The output of Arduino is displayed LCD display and through IoT.

**Ultrasonic sensor -** Ultrasonic sensors are a type of acoustic sensor divided into three broad categories: transmitters, receivers and transceivers. Transmitters convert electrical signals into ultrasound, receivers convert ultrasound into electrical signals, and transceivers can both transmit and receive ultrasound.

**Current sensor -** A current sensor is a device that detects electric current 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. Voltage sensor - **A voltage sensor is** a sensor is used to calculate and monitor the amount of voltage in an object. Voltage sensors can determine both the AC voltage and DC voltage level.

**IR sensor -** Infrared technology addresses a wide variety of wireless applications. The main areas are sensing and remote controls In the electromagnetic spectrum, the infrared portion is divided into three regions: near infrared region, mid infrared region and far infrared region.

**Arduino** - The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. Liquid-crystal display - A liquid-crystal

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display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals combined with Arduino It is used to display cloth effect and motor function.

## CONTROL STRATEGY

The proposed work makes obvious sense to also utilize these advantages in industrial automation environments. In the field of industrial communication, it is quite often necessary to transmit time-critical control signals between sensors, actuators and the automation network. This proposed work compares Bluetooth and Wi-Fi technology in industrial communication and describe using it in loom data monitoring. Additionally, it displays the summary charts (only in HTML format) displaying the overall cost per process and cost per resource (and performer) used in the simulation project. For more information, see the following Viewing simulation report details section. It is the top view of proposed work and we can notice Arduino microcontroller, Current sensor, voltage sensor, Ultrasonic sensor, IoT module and DC motor.

The proposed system uses embedded system as a key component. It consists of various sensors such as IR sensor, current sensor, voltage sensor, ultrasonic sensor, power loom, IoT module. Current sensor used here is to find the current consumed by the power loom. All the sensed data will be transferred to the controller. Arduino UNO is used as a controller in the proposed system. Controller processes the necessary process and displays the data in LCD and will be uploaded continuously to the web server. Ultrasonic sensor is used to detect the faults in cloth.IR sensor is used to count the rpm of motor. Current sensor is used for measuring current. To transmit the data which is collected from loom is transmitted through IoT module. Voltage is measured through Voltage sensor and LCD Display used to display the cloth defect information and motor information. The output of Arduino is displayed LCD display and through IoT.

## SIMULATION OF THE PROPOSED WORK

The Simulation report (in HTML format) contains the main section in links, which you can click to navigate to the respective topic. Additionally, it displays the summary charts (only in HTML format) displaying the overall cost per process and cost per resource (and performer) used in the simulation project. For more information, see the following Viewing simulation report details section.

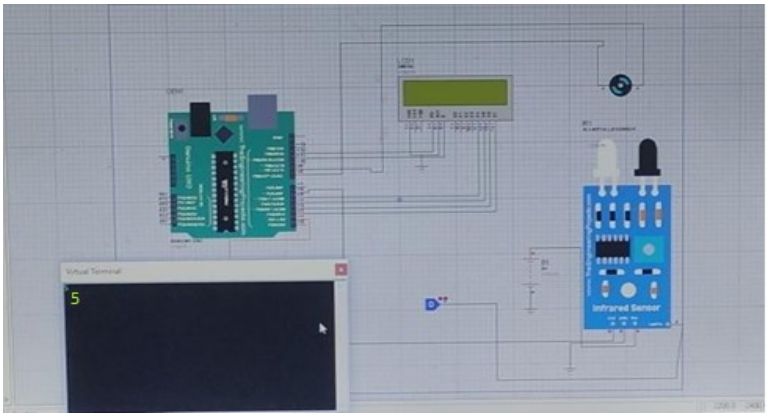


**Fig 2 Simulation Result**

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This monitoring report consists of input voltage, input current and motor RPM. This is also display when the cloth is defected. Actually it is the server; we can able get the data from anywhere. This server has user ID and password. IoT monitoring also enables you to bridge the gap between devices and business by collecting and analyzing diverse IoT data at web-scale across connected devices, customers and applications. You can bridge performance gaps by optimizing performance across multiple applications, APIs, networks and protocols. You also gain actionable insights to improve customer experience, remediate problems and maximize IoT opportunities.

| | |
|---|---|
| 1 | 272 input voltage V :11 input current in A : 0 motor speed in RPM :30 |
| 2 | 271 input voltage V :11 input current in A : 1 motor speed in RPM :30 |
| 3 | 994 input voltage V :11 input current in A : 1 motor speed in RPM :0 273 input voltage V :11 input current in A : 1 motor |
| 4 | 277 input voltage V :11 input current in A : 1 motor speed in RPM :0 |
| 5 | 272 input voltage V :11 input current in A : 1 motor speed in RPM :0 |
| 6 | 271 input voltage V :11 input current in A : 0 motor speed in RPM :0 |
| 7 | 272 input voltage V :11 input current in A : 1 motor speed in RPM :0 271 input voltage V :11 input current in A : 1 motor |

**Fig 3 IoT Result**

## HARDWARE IMPLEMENTATION

The hardware of proposed work is implemented and shown in Fig 4(a).It is the top view of proposed work and we can notice Arduino microcontroller, Current sensor, Voltage sensor, Ultrasonic sensor, IoT module and DC motor.

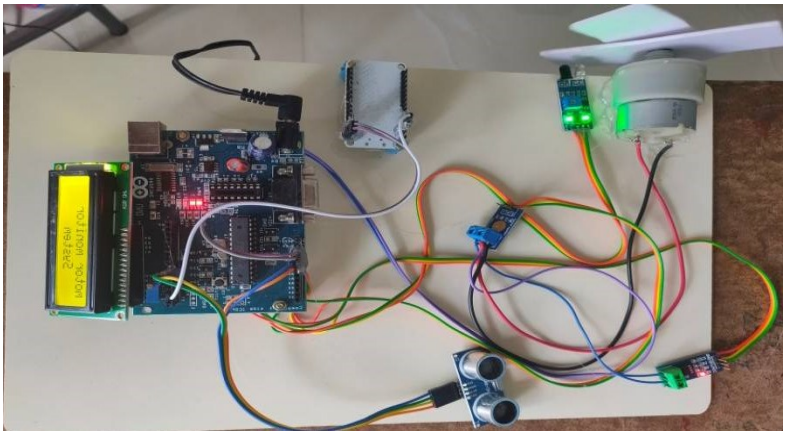

**Fig 4(a) Hardware implementation**

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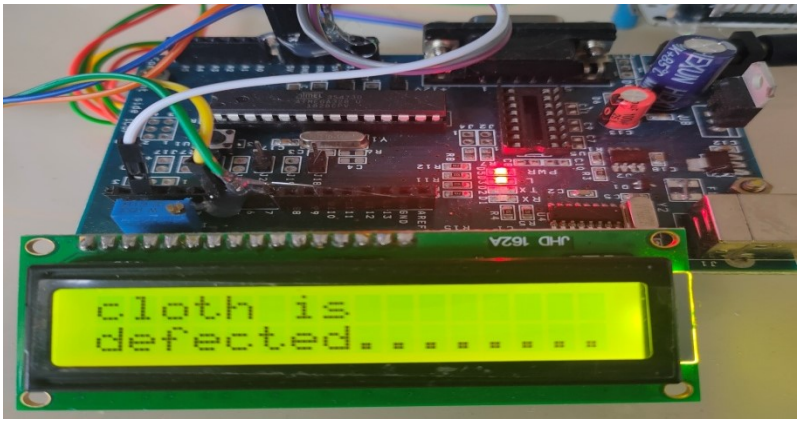


**Fig 4(b) Cloth Defected Notification**

This is a Fig 4(b) indicates the information that cloth is defected by LCD display .With the help of ultrasonic sensor defects in the cloth is identified. Arduino process the command given by ultra sonic sensor and starts to provide notification through IoT module and LCD display. **W**e can notice that all the components are working together to monitor power loom. Here we need mobile network to connect the Wi-Fi module to internet. So that we can access the data from anywhere with the help of IoT.

## RESULT AND DISCUSSION

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 an industry. The Process automation system uses a network to interconnect sensors, controllers, operator terminals 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 a motorized loom powered by a line shaft.

## CONCLUSION

Data can be collected through sensors such as ultrasonic senor, IR sensor, current sensor and voltage sensor. With the help of these sensors data are obtained and processing through Arduino. Thus the result is displayed in IoT web server and in LCD display. The proposed enable fabric inspection with the help of ultrasonic sensor. Power such as current and voltage is monitored by current and voltage sensor. RPM of motor is calculated through Infra-Red sensor. The collected data are in the form of analog signal. These data are given as input to Arduino. The microcontroller processes the analog signal and convert into digital signals. Wi-Fi module plays a vital role in monitoring. It gets the input from arduino and update the collected data in web server.

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