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IOT Controlled Weaving Machine

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ABSTRACT:

Even in this automation world the production calculation in power loom sector is done manually and to sought out this we have devised an innovative way to monitor the weaving process by mounting sensors, even in this automated environment where production calculations and monitoring of the weaving machine are done manually. This invention really benefits the owner as well as all of the employees. The noise generated during the weaving process impairs the workers' ability to hear. Installing sensors such an ESP 32 (WI-FI modular), vibration, temperature, and position sensors (IR) allows for the monitoring of a weaving machine. This machine's primary goal is to decrease the weaver requirement. When the requisite length of cloth is created as indicated by the associated sensor, the machine stops weaving. Additionally, it ceases weaving when the machine generates more heat or vibration than a predetermined amount. The production will be in track with the help of position IR sensor which continuously sense the motion of the production roller and transfer the reading to the ESP 32 modular through which the data will be mapped in the Excel sheet so that the production efficiency will be accessed from different places with the help of IOT

Keywords: Automated Environment, Mounting Sensor, Access the production, IOT

Introduction:

This research intends to create an innovative way to monitor the weaving process by mounting sensors, even in this automated environment where production calculations and monitoring of the weaving machine are done manually. This invention really benefits the owner as well as all of the employees. The noise generated during the weaving process impairs the workers' ability to hear. Installing sensors such an ESP 32 (WI-FI modular), vibration, temperature, and position sensors (IR) allows for the monitoring of a weaving machine. This machine's primary goal is to decrease the amount of weaver . When the requisite length of cloth is created as indicated by the associated sensor, the machine stops weaving. Additionally, it ceases weaving when the machine generates more heat or vibration than a predetermined amount.

What is the IOT?

The network of linked devices that can share data and communicate with one another over the internet without the need for human intervention is known as the Internet of Things, or IOT. These gadgets can be anything from commonplace items like wearable technology, industrial gear, and home appliances to cars and even the infrastructure of entire smart cities.

Actuators and sensors: Actuators allow devices to take actions based on the data they receive, while sensors gather data from the environment, such as light, motion, temperature, and humidity.

Connectivity: In order to connect and send data to the internet or other devices, Internet of Things (IOT) devices rely on a variety of communication protocols, including Wi-Fi, Bluetooth, Zigbee, RFID, and cellular networks.

Data processing: To extract insightful information and set off the proper actions, collected data is processed locally on the device or in the cloud.

Cloud computing: Cloud platforms offer the processing power, storage, and analytics tools necessary to manage the massive amounts of data produced by Internet of Things devices.

User Interface: Remote monitoring, control, and interaction with IOT devices is made possible by interfaces like online dashboards and mobile apps..

What is IOT Controlled Weaving Process?

The integration of Internet of Things (IoT) technology to automatically monitor and operate weaving machines is referred to as a "IoT-controlled weaving process" in the context of the weaving industry. This invention entails attaching sensors to the weaving machine, including an ESP32 (Wi-Fi module), vibration, temperature, and location sensors (IR).

Key Features of Implementing IOT

Automated Monitoring: Position, temperature, and vibration levels are just a few of the characteristics that the sensors continuously track throughout the weaving process.

Worker Safety: The IoT-controlled system helps shield workers from potential hazards and lowers the risk of hearing loss caused by noise during the weaving process by immediately stopping the machine when vibration or heat levels surpass a certain threshold.

Efficiency: By lowering the requirement for manual monitoring and intervention, the system seeks to improve overall efficiency. It does away with the requirement for manual measurement and supervision by stopping the weaving process once the necessary length of fabric is produced. Remote Monitoring: The weaving machine can be observed remotely using a smartphone or other linked devices thanks to the ESP32 Wi-Fi module. This function enables proprietors and supervisors to keep an eye on the machine's performance and quickly resolve any problems, even if they are not physically present at the location.

Benefits of IOT controlled weaving process

Enhanced Safety: By automatically stopping the machine in case of excessive vibration or heat, the system helps prevent accidents and protects workers' health.

Improved Efficiency: Automation reduces the need for manual monitoring and intervention, leading to increased productivity and cost savings.

Real-time Monitoring: Remote monitoring capabilities enable owners and supervisors to track the machine's status and performance in real-time, facilitating timely decision-making and maintenance.

Reduced Manpower: With the automation of monitoring and control processes, the reliance on manual labor is minimized, allowing for optimized workforce utilization and potentially reducing labor costs.

Methodology:

Installing Sensors:

Position Sensor (IR): To count rotations, place the IR sensor above the manufacturing roller. Make sure it is positioned precisely so that it can recognize every turn.

Temperature Sensor: To efficiently monitor heat levels, place the temperature sensor next to the motor.

Install the vibration sensor beneath the machine to identify any unusual vibrations.

Link to ESP32: The ESP32 Wi-Fi module should be connected to all sensors using the proper cabling and interfaces. To guarantee reliable results, make sure each sensor is properly calibrated and tested.

Configuration of Input: Enter the necessary data into the system, including the target number of rotations, ends per inch (EPI), and picks per inch (PPI). The weaving process will be managed by this data, and notifications will be sent out when needed.

Transferring Data:

Data Transfer: Set up the ESP32 module to send data wirelessly using Wi-Fi to a central monitoring system or a specific mobile device. To safeguard sensitive data, make sure secure communication mechanisms are put in place.

Alert System: Incorporate a threshold-based alarm system for vibration and temperature levels into the ESP32 firmware. The ESP32 notifies the linked mobile device of an alarm when the temperature or vibration goes above the predetermined threshold.

Integration of Mobile Applications: Create a mobile application that is able to instantly receive and display data from the ESP32 sensor. When necessary, the application will generate alerts in addition to processing and tabulate the received data.

Data Recording and Evaluation: Include data logging features in the mobile app so that sensor readings from the past can be saved. To find trends, patterns, and any problems with the weaving process, this data can be evaluated.

Remote Control and Monitoring: Through the mobile application, provide remote monitoring and control of the weaving process. Viewing real-time sensor readings, receiving alarms, and even remotely stopping or adjusting the weaving process should all be possible for users. Connectivity to Cloud Storage or Excel: To automatically tabulate and store sensor data for further analysis or reporting, you can optionally interface the mobile application with cloud storage services or Excel.

Objective:

1. By integrating sensors into the weaving machine, the monitoring process may be made more automated, which lessens the need for the weaver to manually intervene. With the help of this goal, vital indicators like vibration levels, temperature, and rotation count will always be tracked and not just by eye alone.

2. By optimizing the weaving process, the goal of incorporating IoT technologies is to enhance production efficiency. The sensors' real-time monitoring allows for prompt changes and interventions, reducing downtime and increasing productivity. This goal is in line with the idea of using less resources to achieve higher productivity.

3. The main objective of installing sensors in the weaving machine is to lessen the amount of manual labor that the weaver must perform. The automation of the monitoring process reduces the need for human observation and intervention, freeing up the weaver to supervise numerous machines at once or concentrate on other activities. The goal of this objective is to maximize staff utilization and streamline processes.

4. Encouraging quick issue analysis and correction is a goal of the IoT-controlled weaving process. The technology minimizes production delays and ensures smooth operation by quickly identifying and alerting the weaver about any problem or irregularity in the machine. This facilitates speedy diagnosis and resolution of difficulties.

Results:

Important outcomes have been obtained via the application of an IoT-controlled weaving process that uses sensors to track vital variables including temperature, vibration levels, and rotation count. The successful automation of the monitoring process through sensor integration has eliminated the need for the weaver to constantly supervise the operation manually. Because of its automation, important parameters can now be continuously and real-time monitored, guaranteeing the weaving machine operates efficiently. Utilizing IoT technologies has greatly increased production efficiency. Proactive alerting systems and real-time monitoring have made it easier to make adjustments and interventions on time, reducing downtime and increasing productivity. The weaving process runs more smoothly and effectively as a result.

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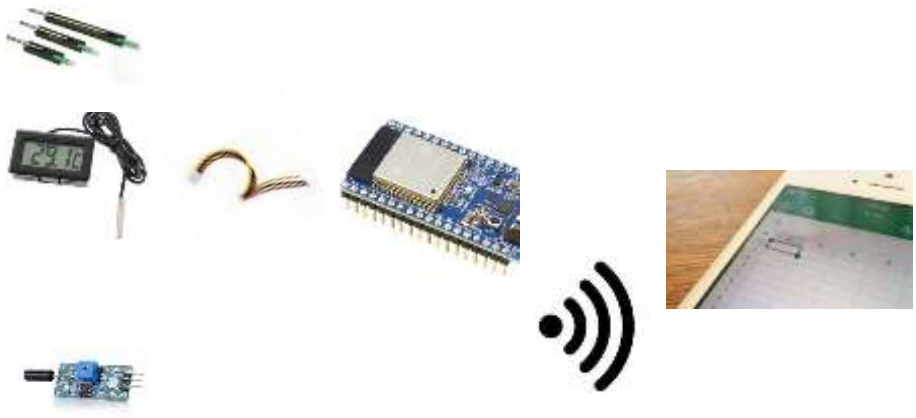

Fig.1 Methodology Proposed

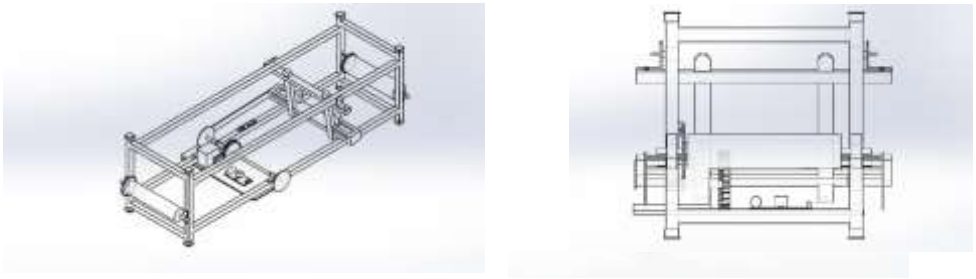

Fig.2 Output

Conclusion:

In conclusion, the weaving sector has benefited greatly from the adoption of IoT-controlled weaving processes. The weaving process is now a more automated, streamlined, and efficient operation because to the use of wireless connectivity and sensor technology. Weavers no longer need to perform as much manual labor, and manufacturing efficiency has increased because to automation of monitoring. Proactive alerting systems and real-time monitoring have made it possible to make modifications and interventions on time, which has reduced downtime and increased output. Additionally, the prompt problem analysis and correction made possible by the IoT-controlled weaving process has guaranteed the seamless and continuous operation of the weaving machine. All things considered, this creative strategy has enormous potential to boost the weaving industry's operational efficacy and competitiveness, opening the door to a more effective and sustainable future.

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