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Autonomous Monitoring Unit for Power Loom

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***Abstract:** Automation plays a major role in today's world. Power loom is the most important industry for the economic development. To modernize the existing technology with power loom machines, an autonomous monitoring system is newly developed. The main goal of the project is to monitor the power loom unit in an autonomous manner. So, the monitoring of the production in the power loom industry is done automatically. By developing the web and mobile application for power loom to store the database and to analyze the production through bar graph option in it. The database of production in power loom is stored in cloud and separate user id is given for customers to maintain the database in the mobile and web application. The analysis can also be done by using the bar graph option present in it to get the idea about the previous productions. The web application which also has machine parameters such as voltage and current which is sensed from the motor, power and efficiency of a particular machine. By using this web application, we can improve the total production and we can reduce the power consumption of the loom.*

***Keywords:** Power loom automation using IoT, Mobile application, Web application.*

1. INTRODUCTION

In 1678, the first ideas for an automatic loom was developed by M. De Gennes and Vaucanson in 1975 but these designs were never produced, and these designs were forgotten. In 1785 Edmund Cartwright patented a power weave device which utilized water power to accelerate the weaving process. To meet the clothing needs of the country, the decentralized power loom industry plays a key role for it. Both fabric production and work generation in the power loom industry have rapidly increased. The country has 22.69 lakhs power looms as at 31 October 2010 spread over around 5.11 lakhs.

An application is developed to automatically to monitor the system and also to bring automation in the small-scale power loom industries. It is also important to consider the calculation of production in meters and energy consumption of the machine. This helps you to know the data from each power loom via an online web application or smart phone application.

2. LITERATURE REVIEW

R. Hajovsky, M. Pies, "Complex measuring system for long time monitoring and visualization of temperature and toxic gases concentration". This measurement system is intended to track temperature and dangerous gasses in old mining dumps for a long time affected by thermal processes. It provides the individual sensors' advantages and drawbacks, including their usage experience. The conclusion includes a summary and visualization of the complex measuring chains at the dispatching station, including data transfer technology.

Z. Machacek, R. Slaby, R. Hercik, J. Koziorek, "Advanced system for consumption meters with recognition of video camera signal", this paper focuses on the design and implementation of the advanced program for state identification of market meters. A variable volume flow meter showing the value consumption means in this sense. A different frame works of the hardware solutions and the recognition algorithms implemented allow for the development of extremely low cost devices with wireless communication to the user interfacing implemented on a mobile network, with SMS text message and personal computer. The system is built on the basis that a camera shows the status of the consumption meters.

3. PROPOSED SYSTEM

The main goal is to monitor the performance automatically through the web and mobile application. The voltage and current sensor sense the current and voltage from the motor in the loom and gives the input to the controller. The Raspberry pi 2 is used to control the operation.

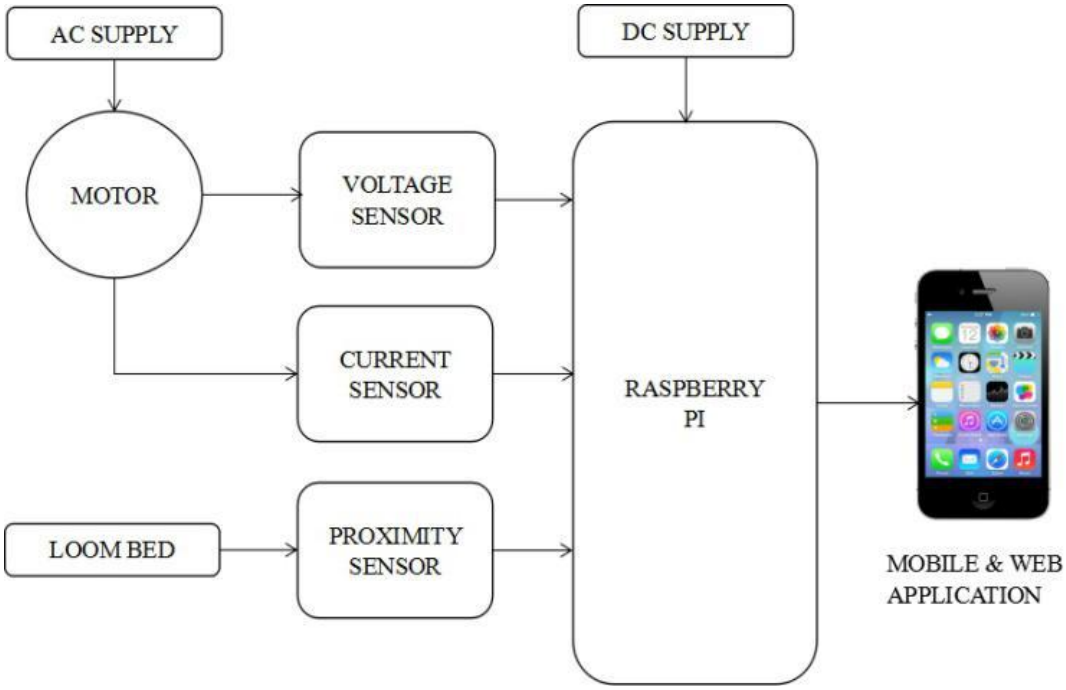

Fig. 1 Block Diagram

The proximity sensor is used to sense the movement of thread from one end to another end in the loom and it will be the one of the inputs to the controller. The web and mobile applications are used to gather the information from looms. LED display is used to display the information for looms individually.

4. HARDWARE DESCRIPTION

Current Sensor

A current sensor is a device that detects electric current in a wire, producing a signal commensurate with that current. The signal produced can display measured currents in an ammeter, be used for control purposes, or be stored in a data acquisition system for further analysis.

Fig. 2 Current Sensor

Voltage Sensor

To test the voltage supply, a voltage sensor is used. The AC and DC voltage levels are calculated. With the voltage sensor the input is analog voltage signals, audible signals, analog current level, frequency and even modulated frequency outputs.

In addition, a voltage capability will assess, track and calculate the voltage supply. The voltage sensor is powered by the voltage and the output can include analog voltage signals, switches, audible signal values, analog current level, frequency or even modulated frequency outputs. Signal and pulse trains may be provided by some voltage sensors and by others, amplitude modulation, pulse width modulation or frequency modulation outputs can occur.

Fig. 3 Voltage Sensor

- Capacitive Voltage Sensor

The capacitor consists of two conductors or only two plates and a non-conductor is placed between those plates. This is called dielectric non-conducting material. When an AC voltage is given on these plates, the current starts to pass through the voltage present on the opposite plate because of either the attraction or repulsion of the electrons. A whole AC circuit without hardware connection is generated in the platform area. This basic concept is the basis for the capacitor voltage sensors. In the live conductor, the voltage sensor is mounted. The voltage sensor is related to the live voltage by the tip of the electrode. Then the entire voltage is produced and voltage can be measured in the sensing circuit.

Proximity Sensor

A proximity sensor is a device, without a physical touch of an object, it is able to sense the presence of surrounding objects. An electric field or electric radiation pulse emits a proximity

sensor. The sensed object is known as the sensor target. The absence of the mechanical parts and the lack of physical contact between the sensor and the object can cause the sensors to have a high reliability and long life of operation. In order to calculate the difference between the shaft and the support bearing, nearby sensors are often used for the system vibration monitoring. As a touch switch is typically a proximity sensor calibrated for a very short range.

Opto Coupler

The electronic device which connects two separate electric circuits via an optical interface which is light-sensitive. The fundamental design of an opto-isolator is also known as an opto-isolator. It consists of an infrared LED and an infrared semiconductor sensitive tool for detecting the infrared beam emitted. All are packed in a light-tight body or metal legs bundle to provide electric connections.

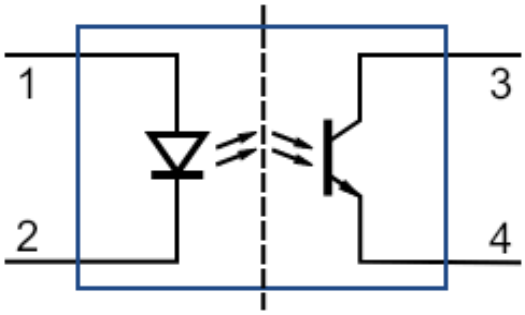

Fig. 4 Opto Coupler

- Types of Optocouplers

Different types of Opto couplers are commercially available depending on your requirements and switching capabilities. Four types of opto couplers are used, depending on their application.

1. Photo Transistor opto-coupler.
2. Image Darlington Transistor is used.
3. Opto-coupler using Photo TRIAC.
4. Image SCR-using opto coupler.

LCD Module

A flat-panel monitor or other electronically modulated optical device that uses the luminous modulation of liquid crystals is a flat-panel monitor which is nothing but the LCD module. Liquid crystals do not actively emit light, but rather generate colored or monochrome images with backlights or reflectors. LCDs can show random images or fixed images, which can be displayed, or concealed in low information content, as in digital clock, such as pre-set terms, digits and seven-section screens. We use the same basic technologies, but arbitrary images contain a lot of smaller pixels and larger elements on other displays.

It is often used on consumer electronic goods like DVD players, video game players and clock are LCD displays. For almost every application, LCD screens replaced large, bulky cathode ray tubes (CRTs). A wider range of LCD screen sizes is available than CRT and plasma, with LCDs in sizes from small digital to very large television receivers. LCDs are replaced slowly by OLEDs which can easily be converted into different shapes, have lower response time, wider color range, practically endless contrast of colors and angles of view, lower weight and slimmer profile. However, OLEDs are more expensive because of the very

expensive lighting materials or phosphorous they use for a particular display size. OLEDs also undergo screen burn-in due to the use of phosphorus, while LCD displays cannot be recycled yet as the technology needed to recycle LCDs is still not commonly used. OLED displays can be recycled at the moment.

Fig. 5 8*6 LCD Display

Raspberry PI

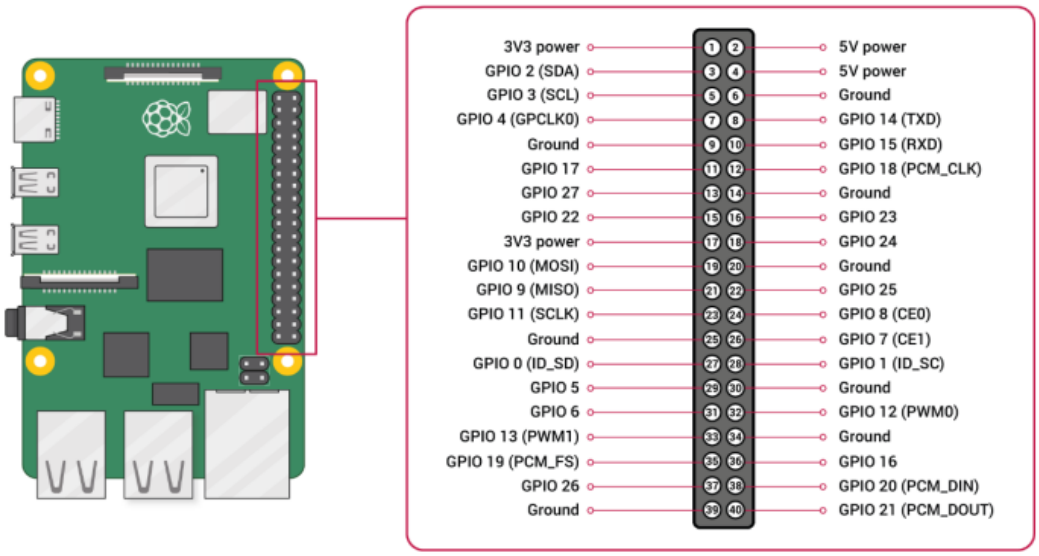

Fig. 6 Raspberry pi 2

The versions A and B are two forms of Raspberry Pi. Model A and model B vary mainly from USB port. Model A is a less energy-consuming board without an Ethernet connection. However, model B consists of an Ethernet port built in China.

We used the Raspberry PI 2 module for our project. The raspberry Pi board features a memory programming processor and graphics chip, CPU, GPU, Ethernet port, GPIO, Xbee socket, UART, PC and other external interfaces. Mass storage is required, too, to use an SD memory flash card. The important hardware requirements of this Raspberry Pi board are mainly SD cards with Linux OS, US keyboard, monitor and power supply, and video cable. The hardware of the Raspberry pi board boots on the hard disks in the same way as the PC boots. Except USB mouse, USB hub, case, web connection, optional hardware specifications.

SMPS

In a number of applications, transfer mode power supplies are used to be effective and efficient power source. This is mainly due to their effectiveness. SMPS offers size, weight, expense, productivity and overall performance advantages. These are now part of an

electronic devices that are accepted. This is basically a system in which power semiconductors continuously "on" and "off" at high frequencies provides energy conversion and control. Types of SMPS

1. Converter from DC to DC
2. Converter forward
3. Converter for Fly back
4. Fly back converter Self-Oscillating

MIT APP INVENTOR

- Introduction

MIT App Inventor was originally developed by Google and now run by the Massachusetts Institute of Technology (MIT) as a mobile application integrated development environment. The programming of computers enables newcomers to build mobile applications (apps) for two operating systems: Android (OS). Android (OS) and iOS are in beta testing as from 8 July, 2019. This falls under Multi-licenses licenses, free and open source applications. It employs a graphical user interface (GUI) that is quite similar to the Scratch (programming language) and Star Logo programming languages. This allows visual objects to drag and fall for the creation of a mobile-enabled application. Google developed App Inventor focused on significant research and on online technology environments in educational computing within Google.

- Procedure Blocks

A process is a block or code sequence that is stored under a label of the procedure block. You can construct a process and name the process block when you want it instead of having to put together the long series of blocks running sequence. A method can also be regarded as a process or a function in computer science.

1. Procedure to 2. Procedure result

5. RESULT

An autonomous monitoring system is used to report the status of each power loom in the industry. In this system the separate user id and password will be given to each power loom user. If the user forgets his/her password, then they can recover it by using the forget password option.

Fig. 7 Log in page

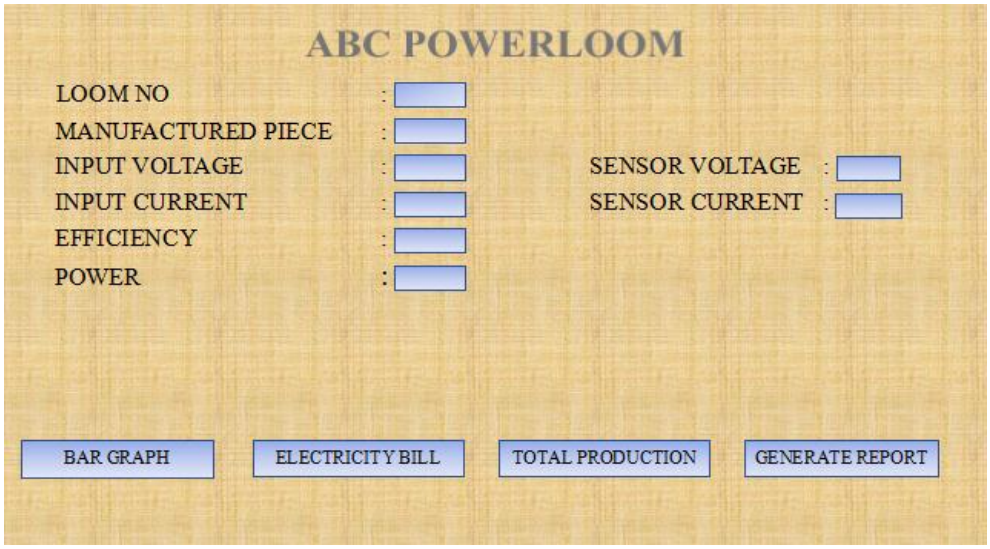

Fig. 8 Data's of power loom

The user can know their manufactured piece, efficiency, power consumption, input current and voltage by using the mobile app and web application. They can also know the bar graph of the production.

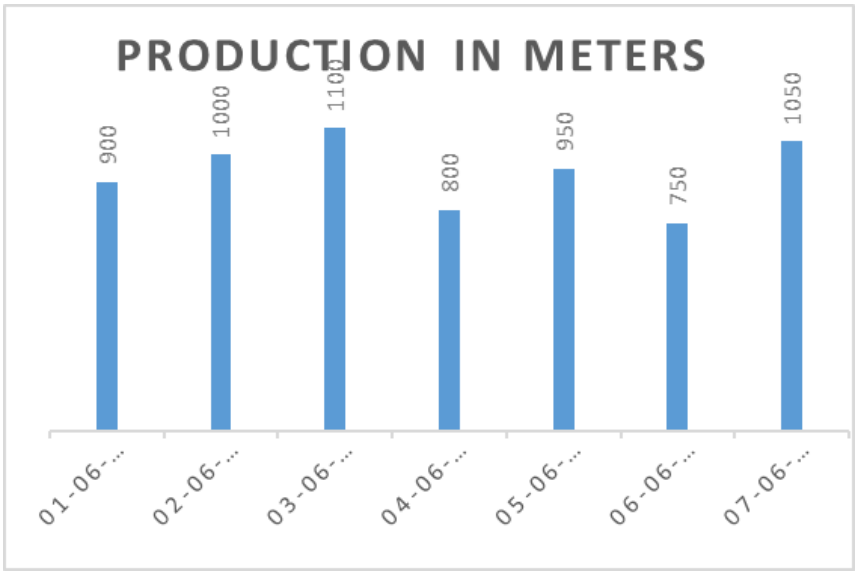

Fig. 9 Bar Graph

6. CONCLUSION

This project gives the idea about the power loom automation which would be helpful for small scale industries. It plays a major role in taking the power loom industry to the next level in this technological era of development. It reduces the manual input that is to be given by the users for knowing about the output. Instead it provides them with the on-hand report about the production. Also it provides various data's related to the power loom through web application. So it helps to the user to develop their loom production as well as reduces the man power and machine power consumption. May this invention lead the automation in small scale power looms.

7. APPLICATION

- The user can read the datas of each loom from anywhere and anytime by using mobile application.
- Also the user can see the various parameters like voltage, current, power, energy and piece lenth of the loom.
- This technique makes this project user friendly and economically.

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