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MSP 430 based Automatic Bobbin Winding Machine

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***Abstract*— The present sewing machine Bobbin winding system is manual. In that system the bobbin is fed manually and removes also manually. Because of human interference many problem occurs in that system, such as it consumes lots of time in case of mass production so that it should affect directly the production rate. Other problem is, many times the bobbins are wound more than the required quantity in the present bobbin winder sometimes the thread will be bound more than the capacity of Bobbin or sometime it wounds very less rounds so that it requires maintenance repeatedly.**

***Index Terms:* MSP430, Bobbin, winding machine, Sensors, microcontroller, PCB.**

INTRODUCTION

One of the worst things about sewing is finding out that your bobbin, that's the smaller spool that works together with the needle and the larger spool to make a complete stitch ran out of thread several stitches ago. If you're lucky, the machine has a viewing window on the bobbin so you can easily tell when it's getting dangerously close to running out, but many machines (ours included) must be taken halfway apart and the bobbin removed before it can be checked.

Having spare bobbins ready to go is definitely the answer. We would venture to guess that most (if not all) machines have a built-in bobbin winder, but using them involves de-threading the machine and setting it up to wind bobbins instead of sew. If you have a whole lot of sewing to do and can afford it, an automatic bobbin winder is a godsend.

PRESENT THEORY AND PRACTICES

Garment industry is the main part of industries in India. India is one of the leading garment product manufacturing countries. The population of India is about 125cr. For such a huge population there is a lot of need for garment products. To fulfil that need we have to increase the efficiency of the present garment production machinery as well the rate of production of finished goods. Currently in the garment industries the bobbin winding mechanism is attached to the swing machine itself. In that system the empty bobbin is required to insert manually on the rotating shaft then the thread should wound 5 to 10 turns on empty bobbin by hand and then push the shaft to make it engage with the driving disc to wound the thread on the bobbin while stitching. Some time because of the problems in the mechanism what happens, the thread will be wound more than the capacity of the bobbin or sometimes it will be wound lesser than the capacity of the bobbin. The more amount of the winding will cause wastage of thread and lesser amount of winding causes the bobbin changing process repeatedly so that it can result in less production rate and create panic to the machine operators. In the present system there is lots of fractioning element so that in that system a lot of maintenance is required.

LITERATURE REVIEW

Bobbins are the small metal spools used in sewing machine; bobbins are filled with thread to stitch cloths. These bobbins are frequently getting empty and you need to rewind it with thread again and again. So I made this machine it can automatically wind thread to maximum 12 bobbins in single run. There are already many bobbin winding machines are available in market. But there prices are more than Rs.50000/- but our MSP430 based bobbin winding machine can build under Rs. 22000/-.

PROPOSED WORK

This paper proposes a system for winding bobbins using advance techniques which are capable to deliver results and the information in a rapid and efficient way. We propose the automatic bobbin winding system on MSP430 microcontroller. It proposes the advance and latest techniques for the existing System. The system will replace traditional fractioning mechanism of the existing system.

The Sensors will give the exact count of bobbins to be wounded and bobbins which are wounded. The sensors are connected to the microcontroller MSP430. The microcontroller MSP430 is placed in the machine.

The sensors data will be displayed on the 16x2 LCD, which is connected to the Microcontroller msp430. The count should reset manually by pressing the reset count button. Provided on the machine we can also set the count of the bobbin to be wound.

There is a buzzer in the system which is provided to give notification of completion of the process as well as to notify any kind of error occurred in the operation of winding.

A. Block Diagram

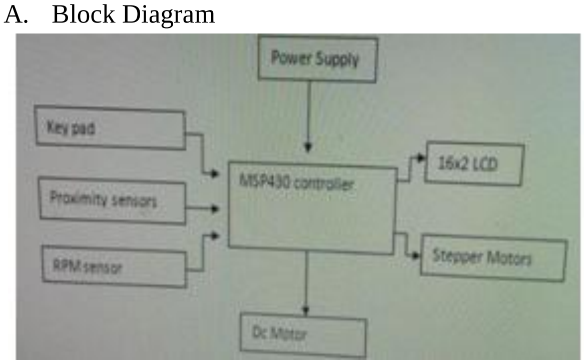

Fig.1: Block Diagram Block Diagram

B. Circuit Diagram

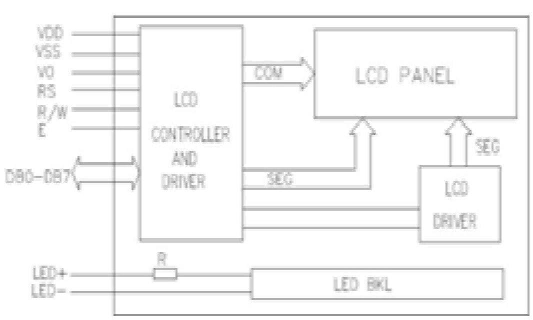

Fig.2: Circuit Diagram

C. Functional Block Diagram

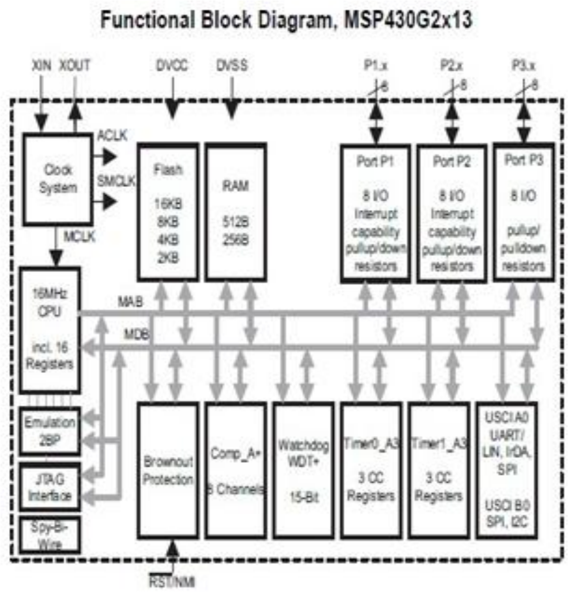

Fig.3: Functional Block Diagram

METHODOLOGY

Methodology will include the steps to be followed to achieve the objective of the project during the project development.

1 The system is placed in the garment units. The system built around MSP430 based microcontroller.
2 RPM counter is used to count the number of wounds of the thread around the bobbin.
3 Microcontroller read all the sensor data continuously.
4 Servo motors are placed to the loading and unloading of the bobbin.
5 The tungsten heating element is placed to cut the thread easily.
6 The inductive proximity sensors are used to count the bobbins which are wounded and to notify the empty bobbin magazine level.
7 Microcontroller displays all these details of count of wounded bobbins and empty bobbins continuously on the LCD connected to the circuit

COMPONENTS REQUIRED

Software:
1 Energia IDE used for programming of MSP430 microcontroller.
2 TEXAS LAB.

Hardware:

1) Msp430g2 development board:

The MSP430G2553 16-bit MCU has 16KB of flash, 512 bytes of RAM, up to 16-MHz CPU speed, an 8-channel 10-bit ADC, capacitive-touch enabled I/Os, a universal serial communication interface, and more – plenty to get started in your development. Rapid prototyping is simplified by the 20-pin Booster Pack™ plug-in module headers that support a wide range of available Booster Pack plug-in modules. You can quickly add features like wireless connectivity, graphical displays, environmental sensing, and much more. You can either design your own Booster Pack plug-in module or choose among many already available from TI and third-party developers. The Launch pad development kit features an integrated DIP target socket that supports up to 20 pins, allowing MSP430 entry- level MCUs to be plugged into the Launch pad development kit. The MSPEXP430G2ET Launch pad development kit comes with an MSP430G2553 MCU by default. The MSP430G2553 MCU has the most memory available of the compatible entry-level MCUs.

Fig.4: Msp430g2 Development Board

2) A4988 stepper driver:

The A4988 is a complete micro stepping motor driver with built-in translator for easy operation. It is designed to operate bipolar stepper motors in full-, half- , quarter-, eighth-, and sixteenth-step modes, with an output drive capacity of up to 35 V and ±2 A. The A4988 includes a fixed off-time current regulator which has the ability to operate in Slow or Mixed decay modes. The translator is the key to the easy implementation of the A4988. Simply inputting one pulse on the STEP input drives the motor one micro step. There are no phase sequence tables, high frequency control lines, or complex interfaces to program. The A4988 interface is an ideal fit for applications where a complex microprocessor is unavailable or is overburdened. During stepping operation, the chopping control in theA4988 automatically selects the current decay mode, Slow or Mixed. In Mixed decay mode, the device is set initially to a fast decay for a proportion of the fixed off- time, then to a slow decay for the remainder of the off- time. Mixed decay current control results in reduced audible motor noise, increased step accuracy, and reduced power dissipation.

Fig.5: A4988 Stepper Driver

3) Nema17 stepper motor:

Operation of Nema17 is similar to normal Stepper Motors. NEMA 17 stepper motor has a 1.7 x 1.7-inch faceplate, and it usually has more torque than the smaller variants, such as NEMA 14. This motor has six lead wires, and the rated voltage is 12 volt. It can be operated at a lower voltage, but torque will drop. Stepper motors do not rotate they step, and NEMA17 motor has a step angle of 1.8 deg. means it covers 1.8 degrees in every step. Wiring diagram for NEMA17 is given below. As you can see that this motor has a Unipolar six- wire arrangement. These wire are connected in two split windings. Black, Yellow, Green wires are part of first winding where Black is centre tap, and Yellow and Green are coil end while Red, White, and Blue is part of a second winding, in which White is centre tap and Red and Blue are coil end wires. Normally centre tap wires left disconnected.

Fig.6: Nema17 Stepper Motor

4) DC Motor:
A direct current (DC) motor is a type of electric machine that converts electrical energy into mechanical energy. DC motors take electrical power through direct current, and convert this energy into mechanical rotation. DC motors use magnetic fields that occur from the electrical currents generated, which powers the movement of a rotor fixed within the output shaft. The output torque and speed depends upon both the electrical input and the design of the motor.

Fig.7: DC Motor

5) 16x2 LCD:
In LCD 16×2, the term LCD stands for Liquid Crystal Display that uses a plane panel display technology, used in screens of computer monitors & TVs, smartphones, tablets, mobile devices, etc. Both the displays like LCD & CRTs look the same but their operation is different. Instead of electrons diffraction at a glass display, a liquid crystal display has a backlight that provides light to each pixel that is arranged in a rectangular network. Every pixel includes a blue, red, green sub-pixel that can be switched ON/OFF. Once all these pixels are deactivated, then it will appear black and when all the sub-pixels are activated then it will appear white. By changing the levels of each light, different color combinations are achievable. This article discusses an overview of LCD 16X2 & it's working with applications.

Fig.8: 16x2 LCD

6) L293d Motor Driver:
L293D is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either direction. L293D is a 16-pin IC which can control a set of two DC motors simultaneously in any direction. It means that you can control two DC motor with a single L293D IC. Dual H-bridge Motor Driver integrated circuit (IC). The l293d can drive small and quiet big motors as well, check the Voltage Specification at the end of this page for more info. You can Buy L293D IC in any electronic shop very easily and it costs around 70 Rupees (INR) or around 1 $ Dollar (approx Cost) or even lesser cost. You can find the necessary pin diagram, working, a circuit diagram, Logic description and Project as you read through.

Fig.9: L293d Motor Driver

7) SG90 Servo Motor:
Tiny and lightweight with high output power. Servo can rotate approximately 180 degrees (90 in each direction), and works just like the standard kinds but with feedback & gear box, especially since it will fit in small places. It comes with a 3 horns (arms) and hardware. smaller. You can use any servo code, hardware or library to control these servos. Good for beginners who want to make stuff move without building a motor controller.

Fig.10: L293d Motor Driver

8) 5v 2a Adapter:
DC 5V/2A, means that the input voltage, to recharge the battery is 5 volts of direct current. … It has two outputs, one 2.1A USB (for tablets and Raspberry Pi and high-current devices, the other 1A USB for phones and smaller devices with feedback & gear

box, especially since it will fit in small places. It comes with a 3 horns (arms) and hardware.

Fig.11: 5v 2a Adapter

RESULTS

Fig.12

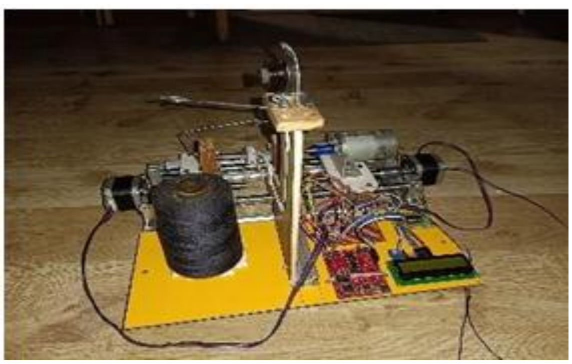

Fig.13

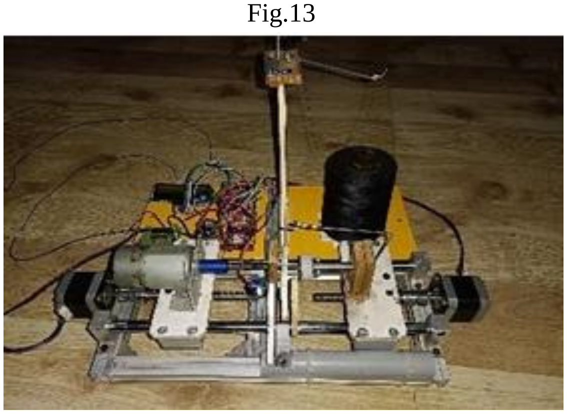

Fig.14

CONCLUSION

The conclusion of this study suggests that knowledge of specific domain improves the results. This Project has been implemented on MSP430. Also, different attributes have been added to the project which will prove to be advantageous to the system. The requirements and specifications have been listed above. This project is implemented using msp430. Using the Servo and DC motors the application will automatically reloads the bobbin and removes it after proper filling the thread on it.

REFERENCE

[1] Mr. Devis A. H., MSP430 MICROCONTROLLER BASICS, Edition:2, Year of publication: 2020, all pages.

[2] Prajval Vaskar, Suraj Zambare, Shraddha Waje, Rushabh Vhora, DESIGN AND DEVELOPMENT OF AUTOMATIC COIL WINDING MACHINE. International Research Journal of Engineering and Technology (IRJET), Volume: 05 Issue: 06 | June -2018.

[3] Moorthy G, Kathervel A, Thalaieswaran S, Chitharthan S, Shanmuga Priyan V G., DESIGN AND FABRICATION OF AUTOMATIC COIL WINDING MACHINE. International Journal of Latest Engineering and Management Research (IJLEMR), Volume 03 - Issue 04 | April 2018.