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Automatic Coil Winding Machine

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***Abstract*: Automatic Coil Winding machine system is made to improve the coil winding for the motor. This project is focusing on the replacement of Manual coil winding machine with automatic coil winding machine. It will provide less time required for making coil. Automatic coil making machine system will solve the problem of time required for making coil. By using this system, the Industry person can make less time required for making coil. This project aim is that reducing the time required for making coils. Automatic coil winding machine consists of a system which has and some Digital display for showing no of turns, ON and OFF switches, can place his order. This project aims at reducing the number of Workers and time required for making coil, thereby reducing the cost paid to the workers. By using the above automatic coil making machine we reduce the time for eg. the 15 min time required for making 48 coil by using this machine We can make 48 turns in the 25 second. Therefore, manufacturing of coil done by using automatic coil making machine will be done in this project by using micro-controller. This machine is inexpensive and easy to handle by any industrial customer.**

***Keywords*: Winding machine.**

1. Introduction

Industries are one of the Important places where the Motor are manufactured. This automatic coil making machine plays a very important role, as they have a very great impact on the Motor manufacturing company. There are many reasons why a motor manufacturing company do not get could get Satisfied profit because of reasons are long time required for the making motor because of lot of time required for making coils. To overcome this problem in industry we can make this automatic coil making machine. i.e. the 10 min time required for making 48 coil by using this machine We can make 48 coils in the 25second.

In addition, the cost we can provide the button Numbering system by using the Arduino Mega and another on advantage is this machine can stop on perfect 48 turns. There are chances of human error, like a while making coil with manual the coils are made loose and sometime 49 turns are made. Our project mainly aims at reducing the workers and less time providing a micro-controller based application. This system has the ability to overcome the time delays in coil making system this system can manufactured because in industry in future there are lots of motors are manufactured. This system is somewhat similar to an automation project.

Automatic coil Making Machine receiving attention because of following reason,

- Reduction of time required for making the coils.
- For making tight turns of coils.
- Easy to operate and less maintenance.
- Increase the production of motor manufacturing.

2. Methodology

A. Block diagram

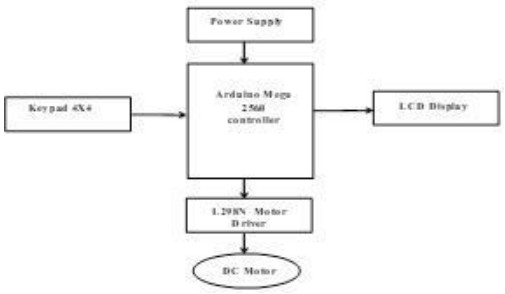

Fig. 1. Block diagram

As shown in below block diagram power supply given to controller Arduino Mega 2560. 4X4 matrix keypad is use as input to controller. Depending input controller will give PWM signal to motor driver L298N, which drives dc motor in such way that we get desired output. The input count and output results will display on LCD display connected to Arduino Mega respectively.

B. Circuit diagram

As shown in below block diagram power supply given to controller Arduino Mega 2560. 4X4 matrix keypad is use as input to controller. Depending input controller will give PWM signal to motor driver L298N, which drives dc motor in such way that we get desired output. The input count and output results will display on LCD display connected to Arduino Mega respectively.

The L298N is a dual H-Bridge motor driver which allows speed and direction control of two DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A.

Let's take a closer look at the pin-out of L298N module and explain how it works. The module has two screw terminal blocks for the motor A and B, and another screw terminal block for the Ground pin, the V_{CC} for motor and a 5V pin which can either be an input or output.

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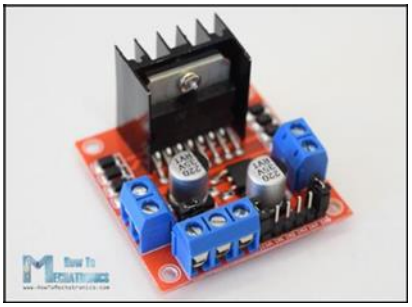

Fig. 2. L298N is a dual H-Bridge motor driver

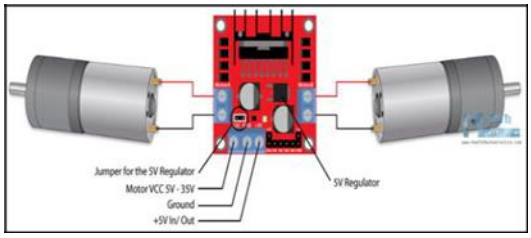

Fig. 3. L298N module

This depends on the voltage used at the motors VCC. The module has an on board 5V regulator which is either enabled or disabled using a jumper. If the motor supply voltage is up to 12V we can enable the 5V regulator and the 5V pin can be used as output, for example for powering our Arduino board. But if the motor voltage is greater than 12V we must disconnect the jumper because those voltages will cause damage to the onboard 5V regulator. In this case the 5V pin will be used as input as we need connect it to a 5V power supply in order the IC to work properly. We can note here that this IC makes a voltage drop of about 2V. So for example, if we use a 12V power supply, the voltage at motors terminals will be about 10V, which means that we won't be able to get the maximum speed out of our 12V DC motor

3. Hardware Implementation

A. Arduino mega

The Arduino Mega 2560 is a micro-controller board based on the ATmega2560 (data sheet). It has 54 digital input/output pins (of which 14 can be used as PWM outputs), 16 analog inputs, 4 UARTs (hardware serial ports), a 16 MHz crystal oscillator.

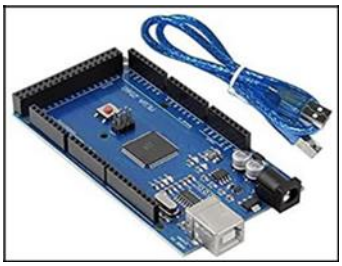

Fig. 4. Arduino mega

B. Programming

The Mega 2560 board can be programmed with the Arduino Software (IDE). The ATmega2560 on the Mega 2560 comes pre-programmed with a bootloader that allows you to upload new code to it without the use of an external hardware programmer. It communicates using the original STK500 protocol (reference, C header files). You can also bypass the boot loader and program the micro-controller through the ICSP (In-Circuit Serial Programming) header using Arduino ISP or similar; see these instructions for details. The ATmega16U2 (or 8U2 in the rev1 and rev2 boards) firmware source code is available in the Arduino repository. The ATmega16U2/8U2 is loaded with a DFU boot-loader, which can be activated by:

*C. LCD 20*4*

Winstar's WH1604A is a character LCD 16x4 display which is built in with ST7066 controller IC; its default interface is 6800 4/8-bit parallel, 5V power supply. ... The WH1604A display LCD 16x4 series is available in several different backlight colors including blue, green, white, yellow-green, amber, red, white LED's.

Fig. 5. LCD 20*4

*D. Keypad 4*4*

4X4 KEYPAD MODULES are available in different sizes and shapes. But they all have same pin configuration. It is easy to make 4X4 KEYPAD by arranging 16 buttons in matrix formation by yourself. As given in above table a 4X4 KEYPAD will have EIGHT TERMINALS. In them four are ROWS of MATRIX and four are COLUMNS of MATRIX. These 8 PINS are driven out from 16 buttons present in the MODULE. Those 16 alphanumeric digits on the MODULE surface are the 16 buttons arranged in MATRIX formation.

Fig. 6. Keypad 4*4

E. DC Gear Motor

12V DC geared motors for robotics applications. Very easy to use and available in standard size. Nut and threads on shaft to easily connect and internal threaded shaft for easily connecting it to wheel.

These precision gear motors are incredibly tough and feature full metal gears to help you drive wheels, gears, or almost anything else that needs to turn. They have a gear ratio of 70:1 and operate up to 12 volts and deliver a stall torque of 194.4 oz-in. and a max speed of 60 RPM. Each precision gear motor

sports a 6mm diameter D-shaft that protrudes from them.

Fig. 7. DC gear motor

F. Driver L298

L298N Dual H Bridge Motor Driver is a motor controller breakout board which is typically used for controlling speed and direction of motors. It can also be used to control the brightness of certain lighting projects such as high powered LED arrays. An H-bridge is a circuit that can drive a current in either polarity and be controlled by pulse width modulation.

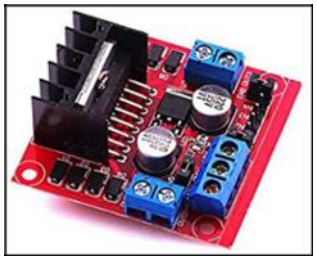

Fig. 8. Driver L298

G. SMPS

Every Electronic device or product requires a reliable power supply unit (PSU) to operate it. Almost all devices in our home, like TV, Printer, Music Player etc. consists of a power supply unit built into it which converts the AC mains voltage to a suitable level of DC voltage for them to operate.

Fig. 9. SMPS

4. Analysis

The coil is wound with no damaging the coil at certain speed and time taken to for winding 48 turns required 20 sec., where while working with hand operating is time required is 6min to 10min.

5. Problems and their Solution

In this machine faced the more problems for running the machine main problem is while the shaft is longer then mechanical support where not given therefore the shaft is not tight properly this problem got a solution and take the bushing on the shaft for support system. The fabrication work is excellent but the panel produce some beep sound this sound creates noise this panel finishing on the panel then this problem gets out.

6. Result

When applying the input to the keypad of the machine then the machine gets output of correct rotation motor is takes place. (For Example. 48 turns given to the keypad then the shaft rotates correctly for 48 turns in 20 seconds.)

7. Conclusion

The earlier method of coil making is manual coil winding and it was hectic and time consuming. The time required for making the coil is very low, even space between two consecutive winding could not be achieved and tight coil formation also not achieved. While the Automatic coil making machine. Is less costly, tight coil formation and increase the coil production rate The main aim of this Automatic coil winding machine is to replace the required manual labour and minimize the time required for making coils. It was found that this machine can wind coils of 48 turns turns in just 20 sec. The main objectives of this machine is to replace the worker or a labour and also the hard work. The increases rate of production and time required for the work is saved by the machine

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