MICROCONTROLLER BASED THREAD STRENGTH MEASUREMENT SYSTEM

Mr. A. B. Gawade[1], Ms. K. A. Gawade[2], Ms. A. M. More[3], Ms. A. S. Shinde[4],

[1]B.E. Student, Dept. of E&TC Engineering, ADCET Ashta, Maharashtra, India
[2]B.E. Student, Dept. of E&TC Engineering, ADCET Ashta, Maharashtra, India
[3]B.E. Student, Dept. of E&TC Engineering, ADCET Ashta, Maharashtra, India
[4]Assistant Professor, Dept. of E&TC Engineering, ADCET Ashta, Maharashtra, India

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Abstract – *This paper puts forward the solution to the tensile strength measurement of various materials. Now days compact system takes place major role. The system shown in this paper uses different types of mechanical as well as electronics component. This system uses the AT89c51 microcontroller for the controlling purpose. This data or indications can be shown on the LCD display.*

Key Words: Load cell, Microcontroller, ADC, DC motor.

1. INTRODUCTION

As we are moving towards the world of microprocessor and microcontroller and this technology has been used in every field. We are developing a product for the textile industry to measure the thread strength. Our system is different than the current available one. This system depends on the microcontroller and it will reduce the time to check the strength of the thread. In the recent system for checking the strength of the thread, they use the heating coil conditions or they use the arc system for the checking strength. Here we don't require the heating coil like conventional machine. We use real time system this system is interface with the pc. These types of tests may be performed under ambient or controlled (heating or cooling) conditions. Strength testing is performed on materials like metals, plastics, leather fabrics, adhesives, films, paper, composites, rubbers etc. We have decided to make a system that will help to measure the strength of the thread. So we are performing the test of the thread strength measurement by using the microcontroller system. Here we are displaying the strength of the thread on LCD display by using the force or pressure sensor. We expect our project to be able to accurately measure the strength of the thread. After break the thread sound the alarm and display the reading on LCD. This system includes many components namely as microcontroller, Load cell, adc, instrumentation amplifier, dc motor and motor drivers, lcd display , keys etc. The different component have different task assigned to it. Microcontroller controls the whole system, EPROM store the run time

reading, switch and control circuitry is used to turn on/off the system, motor driver is used to control the dc motor , and lcd display is used to display the current reading of thread.

1.1 Load cell

When we design our project strength measurement system, our first work was to determine which mechanical component to use as a pressure or force transducer. As we know most of times load cell is used for the weight measurement. So we have used the load cell. (Fig. 1)

Figure 1: Load cell

The load cell is an easy tool for weight measuring or the pressure or force measurement. It can be used as pressure or force sensor it will give result if we apply external force on it. The module features, The LCC-ESP4 load cell is designed for electronic bench and platform scales, medical scale, and any application where a low profile load cell design is a must. Low in cost and suitable for a wide variety of OEM and force measurement applications, the LCC-ESP4 load cell is readily available in large or small quantities. The strain gauge area and electronic parts are coated and sealed to provide an IP65 protection class rating

1.2 ADC Module: (MCP 3202)

MCP 3202 is a successive approximation 12 bit analog to digital converter with on board sample and hold circuitry. The MCP 3202 is programmable to provide a single pseudo differential input pairs or single ended input. Differential non linearity is specified at +- 1 LSB an integral non linearity

is offered in one LSB. Communication with the device is done using a simple serial interface with the SPI protocol. The device is capable of conversion of up to 100ksps at 5volt and 50ksps at 2.7volt. This adc is use for the sensor interface, data acquisition, process control and battery operated system.

Figure 2: ADC MCP3202

1.3 Motor driver :(L293d)

L293Dis a dual H-Bridge motor driver, so with one IC we can interface two DC motors which can be controlled in both clockwise and counter clockwise direction and if you have motor with fix direction of motion. You can make use of all the four I/Os to connect up to four DC motors. L293D has output current of 600mA and peak output current of 1.2A per channel. Moreover for protection of circuit from back EMF output diodes are included within the IC. The output supply has a wide range from 4.5V to 36, which has made L293D a best motor driver.
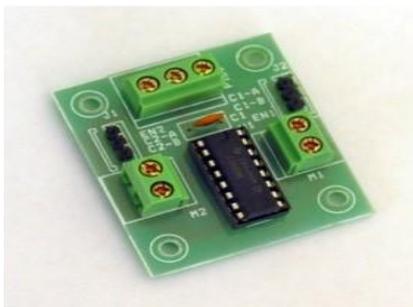

Figure 3: Motor driver

1.4 DC Motor

We use dc motor here because it is easy to interface with the microcontroller and we can control its speed also. We do many things with the dc motor so we use the dc motor in our system.

1.5 System concept

We are designing thread strength measurement system for measuring the strength of the thread. In this we are using AT89c51 microcontroller. It is CMOS 8 bit on chip 8K byte of in system programmable flash memory, it has 256 byte of RAM, Two 16 bit timer counter. Microcontroller is of two packages which are DIP and QFP. Here we are using 40-pin DIP package which has the same pin configuration as of 8051 microcontroller, including the external multiplexed address and data bus. Microcontroller has four ports which are PORT 0, PORT 1, PORT 2, and PORT 3. PORT3 considered as input of ADC. PORT 0 is output port which is connected to LCD.
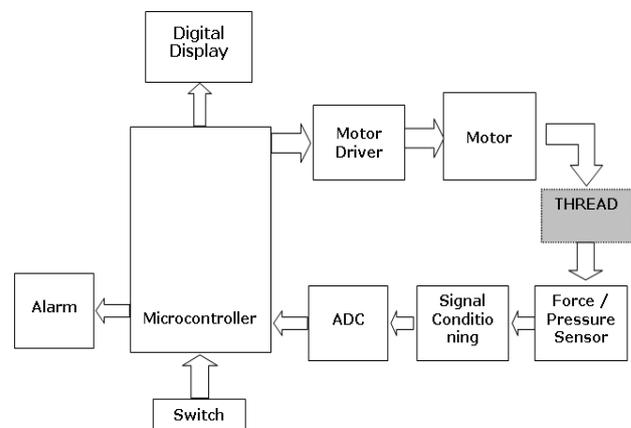

Figure 4: Block diagram

In our project we are using load cell as force or pressure transducer. The load cell is connecting to the microcontroller. The information collected from load cell as output is in analog form hence it is converted into digital form by ADC. The output values are display on LCD continuously. Microcontroller compares all values of with the minimum and maximum level. This compared output show on the LCD. If output value goes above maximum limit set value then it will show a maximum force on the LCD. Using hyper terminal we also take our reading on the computer.

2. Desired output

In our Thread strength measurement system project we are using LCD, Buzzer output side.

We have used 16*2 LCD i.e. 16 character in 1 line, total 2 lines are there. LCD is used to display output. LCD has 16 pins in which D0 to D7 are used for data transmission. There are two VCC and ground in which one is used for LCD

and another for backlight. Register used are RS0 and RS1 in which RS0 for displaying command and RS1 for data.

The LCD shows the current output when the system is on. When the thread gets break that time it will show the maximum output on the screen and that output will be the strength of that thread. This strength is measured in grams.

When the thread break the motor will stop automatically and the buzzer will ON and then we come to now the maximum reading.

3. CONCLUSIONS

It is obvious that thread strength measurement system is become very compact but it is very easy to use and this same system with small modification we can use it for various tensile strength measurement systems.

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BIOGRAPHIES

Mr. Abhijit B. Gawade
He is studying in Annasaheb Dange College Of Engineering and Technology, Ashta, MH, India.
He is student of electronics and telecommunication department.

Ms. Kavita B. Gawade
She is studying in Annasaheb Dange College Of Engineering and Technology, Ashta, MH, India.
She is student of electronics and telecommunication department.

Ms. Ashwini M. More
She is studying in Annasaheb Dange College Of Engineering and Technology, Ashta, MH, India.
She is student of electronics and telecommunication department.

Mrs. Ashwini S. Shinde
She is working as Assistant Professor in Annasaheb Dange College Of Engineering and Technology, Ashta, MH, India.
She is having 9 years of teaching experience. Area of specialization: Image processing