Embedded Based Fabric Testing Oven

Subhashree S[1], Uma Maheswari M[2], Vijayprasath S[3], Vivek kumar M[4]
Department of Electronics and Communication Engineering
[1, 2, 3, 4] SECE, Coimbatore, India

Abstract-*This project is aimed at to developing a system that controls the fabric testing oven automatically. The system controls the sequences of testing process and sends the details to the personal computer. The system checks whether the door of the oven is closed by using relay reader. After closing the door the system starts to test the fabric. A photo sensor is used to detect the position of the fabric placed inside the oven. The temperature of the chamber is detected by thermocouple and the values are displayed using LCD and sent to personal computer through RS232. The maximum temperature level at which the fabric can sustain can be determined. After the completion of testing process the chamber will be cooled down using exhausted fan. After that the solenoid valve will be opened. Then the next fabric to be tested will be placed in the chamber.*

Keywords*-*Atmega 32, Fabric, Limit switch, Photo sensor, Thermocouple

I. INTRODUCTION

In India there are many textile industries for fabricating and testing the fabric. Those fabrics are used in many applications such as military, satellite communication etc. Testing plays vital role in textile industries rather than fabrication. There are various instruments are available to test the fabric which has various parameter. Sustainability of temperature is the important parameter of the fabric. Textile industries are using oven to test the sustainability of the fabric. That chamber using temperature sensor to detect the temperature of the chamber and it is displayed in the display that value will be noted down by the persons who handles the testing chamber and finds the maximum temperature at which the fabric can sustain. It takes more time and more power. And there may be a chance to accidents during the testing process poor safety conditions. So our aim is to design the system which controls the fabric testing oven automatically and as well as enhance the safety requirements to avoid the unexpected accidents while testing the fabric.

II. LITERATURE SURVEY

M.Dhilsath Begam and Banupriya.B serves as a Assistant Professor at Sri Krishna Arts and Sceince College.Their research focuses on Working Capital Management of cotton mills. They made two types of research namely Ratio analysis and Statement of changes in working model.D.W.Hill is a research scientist.He published a journal titled on Instrumentation in process and product control in the textile industry. He made research on process followed by the textile industries.Nada Jebali, Najeh Maatoug, Mehdi Sahnoun are research sceientists.They published a journal titled on Effect of test conditions and structural parameters on surface roughness of weft knitted fabrics. This paper explains about yarn count and fabric roughness.

Existing Method

In existing system the temperature is noted down in the paper manually. The position of the fabric cannot be found out. There is no safety during testing process. The cooling process will not be done automatically. It will be done manually. The existing system does not ensure that whether the door of the oven is closed or not. It starts the testing process when the start button is switched ON. It may cause the accidents.

Proposed Method

In proposed system the value of the temperature is sent to personal computer. Position of the fabric is detected using photo sensor at particular time. The door of the chamber will be controlled by limit switch. It will lock the door using solenoid valve. So it will enhance the safety during the process. Cooling process will start automatically after the completion of testing process.

III. BLOCK DIAGRAM

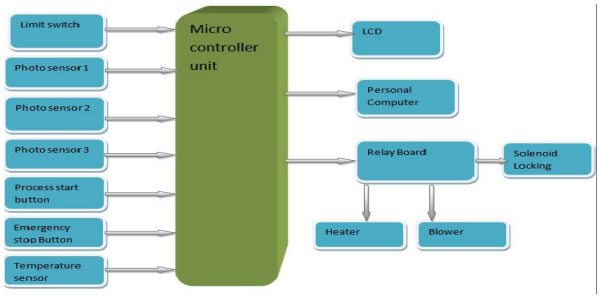

Fig 1: Block diagram

Microcontroller Unit

Atmega 32 is used to control the whole system.It is the 40 pin IC. The Atmel 8-bit AVR RISC based microcontroller combines 32 KB ISP flash memory with read while write capabilities 1 KB EEPROM,2 KB SRAM,23 general purpose I/O lines,32 general purpose working registers,three flexible timer/counters with compare modes,internal and external interrupts,serial programmable USART,a byte-oriented 2 wire serial interface,SPI serial port,6-channel 10 bit A/D converter programmable watchdog timer with internal oscillator, and five softwareselectable power saving modes.The device operates between 1.8-5.5 volts.The device achieves throughput approaching 1 MIPS per MHz

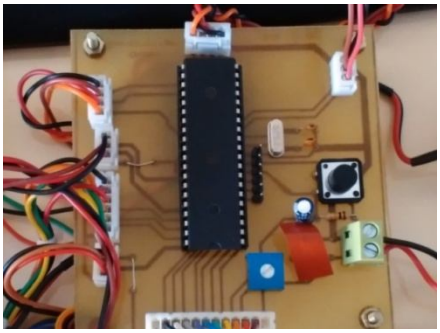

Fig 2: Atmega 32 board

Photo sensor

A photo sensor is a type of electrical component that enables the detection of light,infrared and other forms of electromagnetic energy.It is used in electronic and computing devices to receive input or transmit data in the form of light or electromagnetic signals.Photo-sensors also known as photo-detectors.

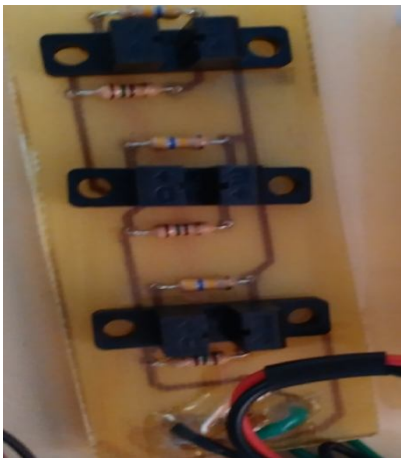

Fig 3: Photo sensor Module

Temperature Sensor module

A Thermocouple circuit is formed when two dissimilar metals are joined at both ends and there is a difference in temperature between the two ends. This difference in temperature creates a small current and is called the seebackeffect after Thomas seeback who discovered this phenomenon in 1821.When there is a difference a small voltage is formed within this circuit.This voltage or EMF (electro motive force)is usually measured in the 1/1000th of a volt(mill volt). We are using AD096 IC to convert analog temperature value into Digital value.

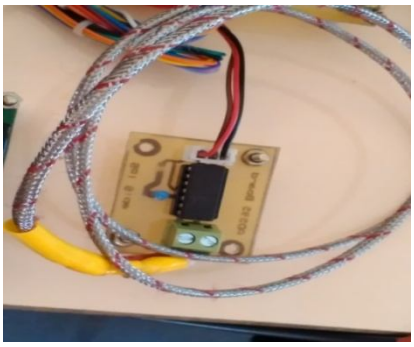

Fig 4 :Temperature sensor module

Relay Module

A relay is electromagnetic switch operated by a relatively small electric current.The heart of a relay is an electromagnet.There are two kinds of operation it will perform that are normally open, normally close.

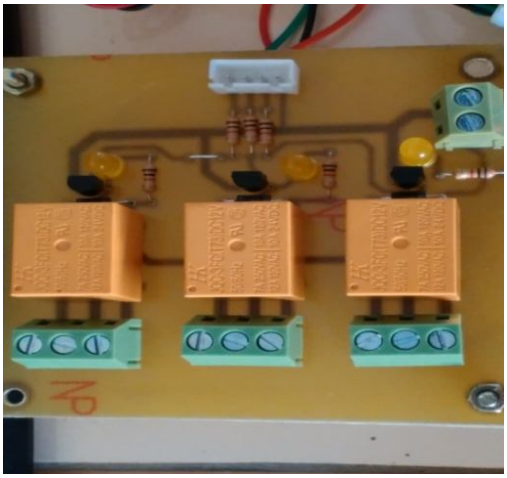

Fig 5: Relay board

Liquid crystal Display

A liquid crystal display is a flat panel display or other electronically modulated optical device that uses the light modulating properties of liquid crystals.LCDs are used in a wide range of application including computer monitors,

television, instrument panels, aircraft cockpit displays, and indoor outdoor signage.

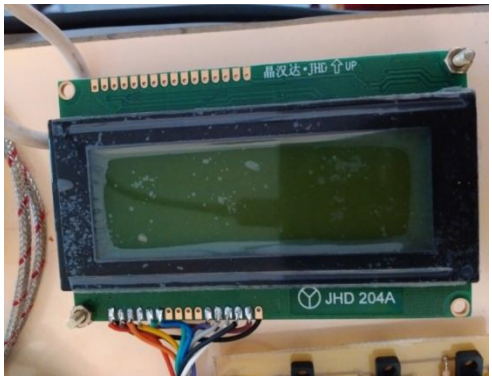

Fig 6: Liquid Crystal Display

Power Supply Board

Regulated power supply is an electronic circuit that is designed to provide a constant dc voltage of predetermined value across load terminals. It consists of an ordinary power supply and a voltage regulating device. The output from an ordinary power supply is fed to the voltage regulating device that provides the final output. The output voltage remains constant irrespective of variations in the ac input voltage.


Fig 7: Power supply board

UART

UART cable is also called as USB serial port cable. It is debugging tool in embedded system software development. It can redirect a serial console to PC and can use any command via it. It can easily monitoring and debug cubieboards or any other embedded boards.


Fig 8: UART cable

IV. HARDWARE IMPLEMENTATION

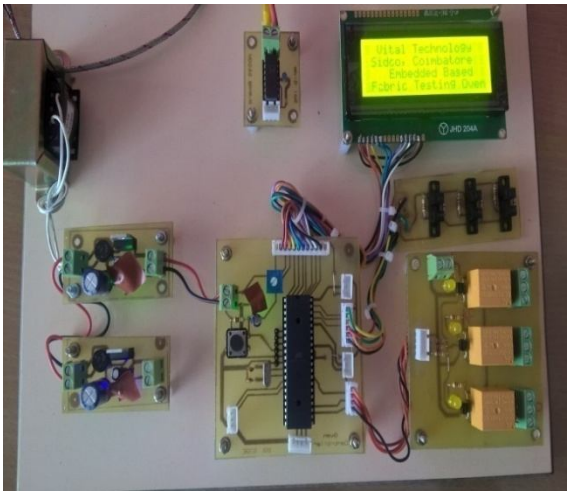
Fig 9: Prototype of the Embedded based fabric testing Oven

Working of Hardware

Initially fabric is placed inside the chamber. The system ensures that whether the door of the chamber is locked by solenoid valve by using limit switch. After that process start button is enabled and it is pressed by the user to start the testing process. The temperature of the chamber is determined by the thermocouple and position of the fabric is determined by the photo sensor, the values are displayed in the LCD and as well as sent to personal computer. After the particular temperature the fabric will be expanded and it will not be detected by the photo sensor. The temperature at which the photo sensor not detect the fabric is determined which is the sustainable temperature of the fabric. When the micro controller get low signal from the photo sensor, it will call off the testing process and starts the blower to cool the chamber through relay. After the cooling process the solenoid valve will be automatically disabled and the door will be opened to place the next fabric to be test.

V. FUTURE WORK

1. In future the project will be enhanced using IOT. By using IOT the data will be sent to cloud and it will be accessed at anywhere.
2. This testing method can be implemented to test the yarn and tensile strength.

VI. CONCLUSION

The main objective of the project is to control the fabric testing oven automatically to reduce the manpower and reduce the time consumption. Thus by using various sensors the automation in fabric testing oven has been made successfully.

REFERENCES

[1] Serra,H., Correia, j., Gano,A.J., de Campos, A.M., & Teixeira, I. (2005)" Domestic Power Consumption Measurement and Automatic Home appliances Detection."2005 IEEE International Workshop on Intelligent Signal Processing,pp.128-132

[2] NitinS, Choubey, Manish Agarawal (2016),"Automation in textile Industry "International Journal on Textile Engineering and Processes ISSN 2395-3578, Vol 2, Issue 1.

[3] Di Peng, Shengpeng Wan(2013),"Industrial Temperature Monitoring System Design Based on Zigbee and Infrared Temperature Sensing", Optics and Photonics Journal,2013,3,277-280

[4] Muhammad Dawood Husain, Ozgur Atalay, Richard Kennon(2013),"Effect of strain and Humidity on the Performance of temperature sensing fabric", International Journal of Textile Science 2013,2(4):105-112.

[5] Burns.J,32.2 Resistive Thermometers, in the Measurement ,Instrumentation,and Sensors:Handboook,JGWebster,Editor.1999,CRC Press LLC:USA.p.32.13-32.24

[6] J.G. Montalvo, T.M Von Hoven (2008),"Textile Technology" The Journal of Cotton Science 12:33-47(2008).

[7] ShayamaSubair,LizyAbraham(2014),"Analysis of different Temperature Sensors for space applications", International Journal of Innovative Science, Engineering &Technology,Vol.1 Issue 6,August 2014

[8] ZHANG Jin-min. "Application of single-bus digital temperature system based on Ds18B20".Chinese instruments. 2005(03): 86-88.

[9] A.Livshitz, B.Bukengolts, B.H. Chudnovsky and B.A. Chudnovsky,"On-Line Temperature Monitoring Of Power DistributionEquipment"Material IEEE, 2005.