Automation System Based On Temperature Sensor

Dr. Madhukar S. Chavan[#1], Ms. Terdale Dipali R.[#2], Ms. Taralekar Shivani U.[#3] Ms. Raut Shubhangi P.[#4]
1 Associate Professor, Department of Electronics and Telecommunication Engg, P. V. P. Institute of Technology Budhgaon, Sangli
2,3,4 UG Students , Department of Electronics and Telecommunication Engg., P. V. P. Institute of Technology Budhgaon, Sangli,

***Abstract* —** This paper describes temperature based automation system for controlling the temperature at specific set point, which is suitable for small scale fruits drying within a closed vaccum chamber. The thermistor of NTC type is used as a temperature sensor to control the temperature inside the vaccum chamber.The temperature of the chamber is controlled in a way that the aperture plate of the chamber gets closed as temperature inside the chamber increases above the set point and opens as temperature inside the chamber is below the set point. The 89C52 microcontroller is used to control the system. The microcontroller is programmed using MPLAB. Proteu software is used to develop circuit diagrams. After implementing the components on the circuit board and programming the microchip, the system worked as expected.

Keywords—Microcontroller, ADC0808, Regulator, Thermistor, ULN2003, L293D, Relay, Display

I. INTRODUCTION

In India different types of fruits and vegetables are available in various region of the country. All the agriculture products grow in different seasons and in a particular area only. Preserving food product by drying is an important operation continued from prehistoric period. Drying the fruits at the constant temperature is an important task. So the accurate measurement of the temperature is required. The temperature sensor Thermistor gives an accurate measurement of the temperature ranges between the -55 to +150 degree. A thermistor is also used for voltage regulation, volume control, time delays and circuit protection. This resistor has many practical applications both in terms of manufacturing and personal products such as microwave, circuit protector, automotive, digital thermometer, rechargeable batteries etc. They are also found in every day application such as fire alarms, ovens and refrigeration. Thermistors are thermally sensitive resistors whose prime function is to exhibits a large, predictable and precise change in electrical resistance when subjected to a corresponding change in body temperature. The negative temperature coefficient (NTC) thermistors exhibit decreases in electrical resistance when subjected to an increase in body temperature.

II. Design And Implementation

1. Interfacing ADC0808 with 89C52 microcontroller

In the circuit below, 8 bit data bus of ADC0808 is attached with 8051 on Port 0. And control signals of ADC0808 are attached on Port 2 of 8051 microcontroller. LCD is attached on Port 1, LCD is used here just to show the output value of ADC.

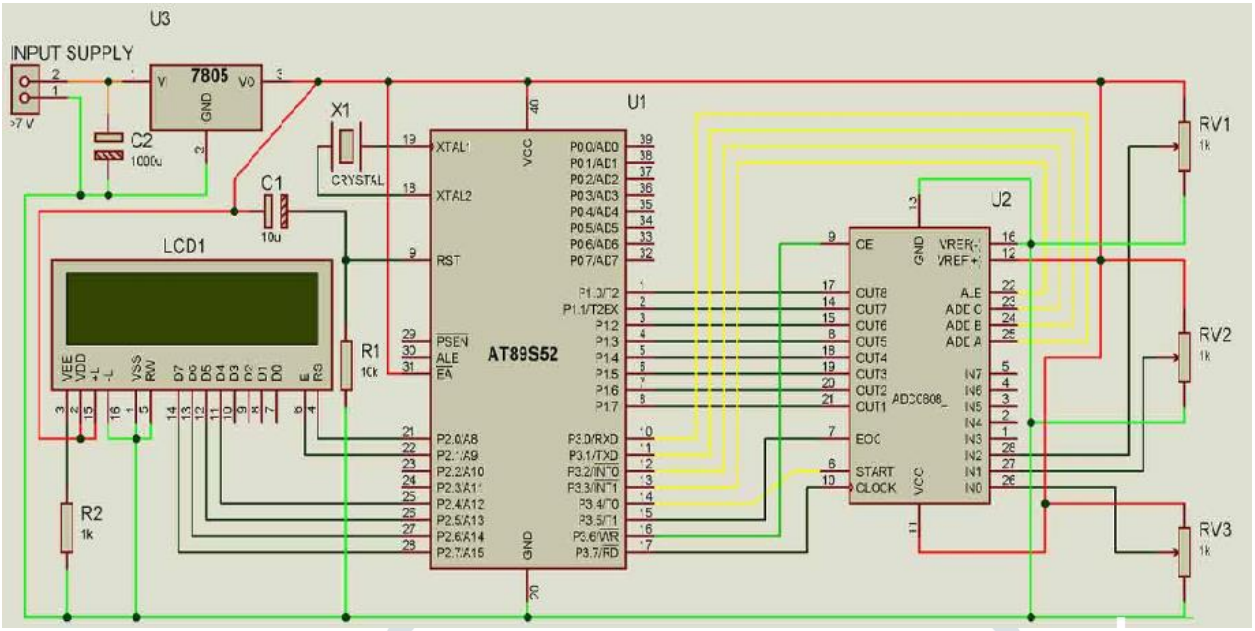

Figure1. Interfacing ADC0808 with 89C52 microcontroller

ADC0808 has 8 input channels. You can use any channel for ADC purposes in the code. A potentiometer (i-e variable 10k resistor) is attached on IN1 of ADC0808 just to demonstrate how to use this code. Input voltage at IN1 is read in the code and displayed on the LCD. Since, ADC0808 gives an output of 8bit value, so a voltage value of 0v at IN1 will mean ADC value of 0 and a voltage of 5v at IN1 pin means ADC value of 255. In the above figure, it is clear that a when voltage of 2.5v is applied on IN1 pin and ADC value of 127 (i-e half of 255) is displayed on the LCD correctly.

2. Interfacing 89C52 microcontroller with Motor

The major components in the above circuit diagram are at89c51 microcontroller and motor driver. Here, the motor driver input pins IN1, IN2 are connected to the P3.0 and P3.1 respectively to control the motor directions. DC motor is connected to output terminals of L293D. EN1 pin is connected to the 5V DC to drive the motor.Switches are connected to the P2.0 and P2.1 of the Microcontroller in pull down configuration. First switch rotates the motor in clockwise direction and second switch rotates the motor in anti clockwise direction. 8th and 16th pins of the motor driver are connected to the +5V supply.

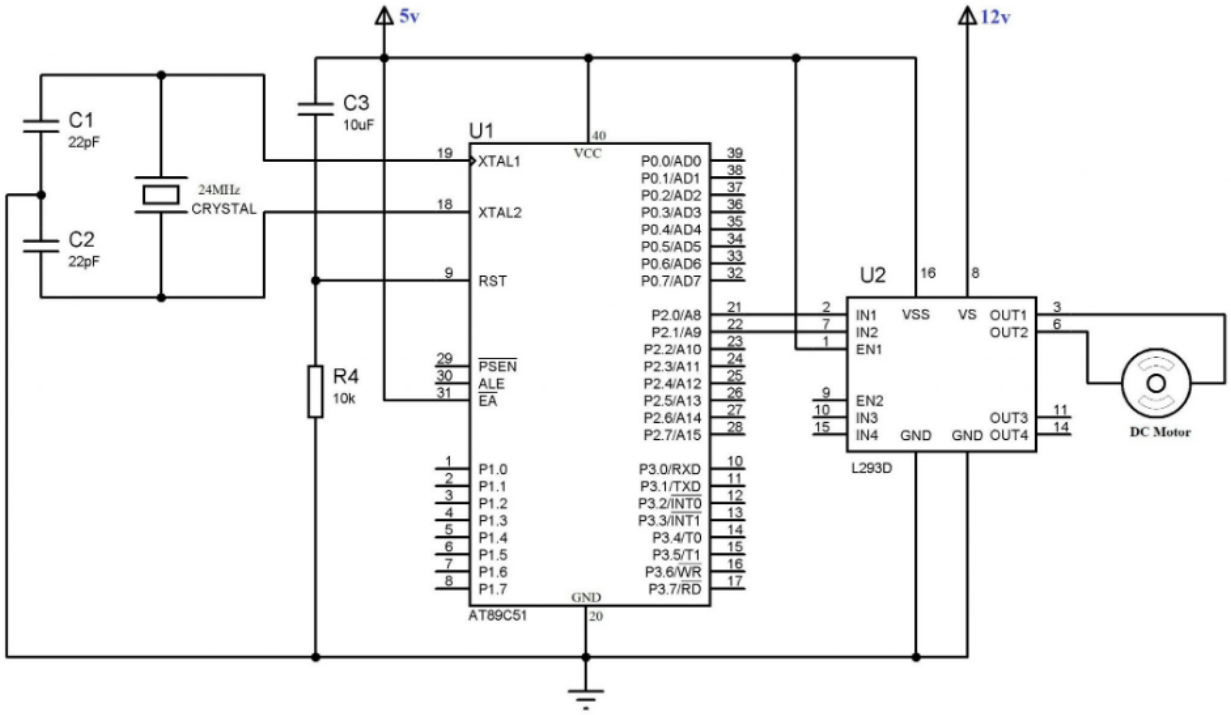

Figure2. Interfacing 89C52 microcontroller with Motor

3. *Interfacing Relay circuit with microcontroller 89C52*

ULN2003 is basically a relay driver IC and it is a darlington array having high voltages and high currents as well. It is made up of seven open collector darlington pairs having common emitter which shows ULN2003 has a capability of handling seven different relays at a time.

Relay is basically a switch which opens and closes the circuit either electronically or mechanically. In other words we can say that a relay is an electromechanical switch which uses electromagnetism from small current or voltage to switch higher current or voltage for different appliances. When a relay is in Normally Open (NO) contact, there is actually an open circuit until the relay is energized. When input voltage is applied across its coil, NC changes to NO and NO changes to NC. When input voltage is supplied, we say that the relay is energized. It has several features e.g. it can be used for switching smaller voltage to higher. But it can not be used in power consuming devices. It has a wide range of applications. It can be used in home appliances, electronic circuits where there is a need of protection.

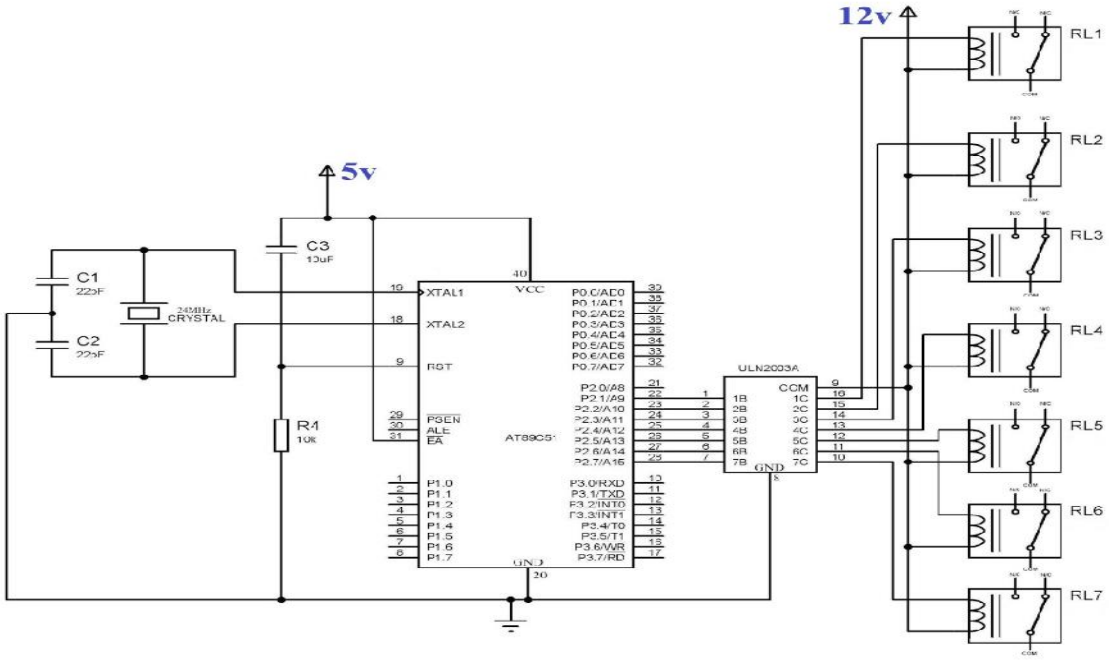

Figure3. Interfacing Relay circuit with microcontroller 89C52

III. BLOCK DIAGRAM

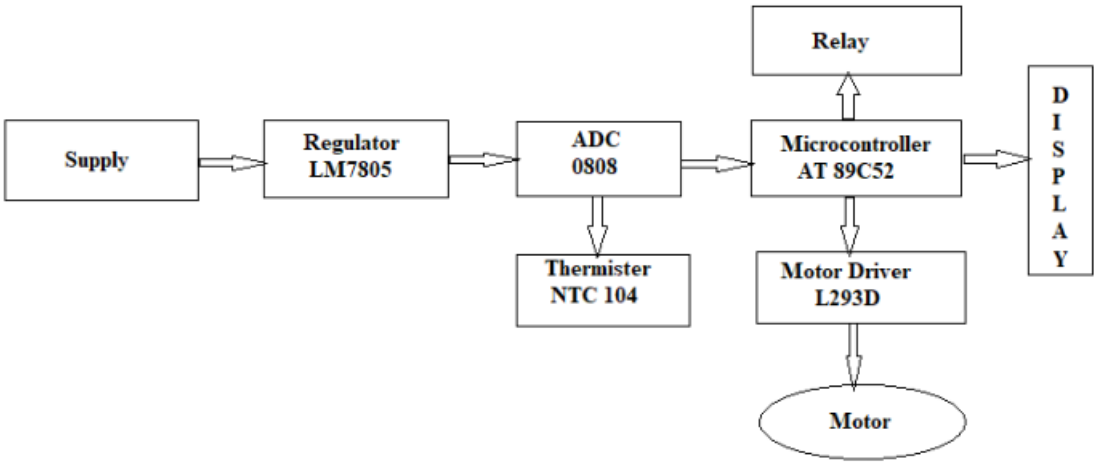

Figure4. Block Diagram of temperature controlling

The above fig shows the block diagram of automation system based on temperature sensor. The power supply is given to the circuit through the voltage regulator which supplies the constant voltage to the circuit. The thermistor is connected to the ADC to convert the analog output of the thermistor into the digital form to display. The motor is controlled by the microcontroller.

IV. HARDWARE IMPLEMENTATION

Figure5. Hardware Implementation

V. SOFTWARE IMPLEMENTATION

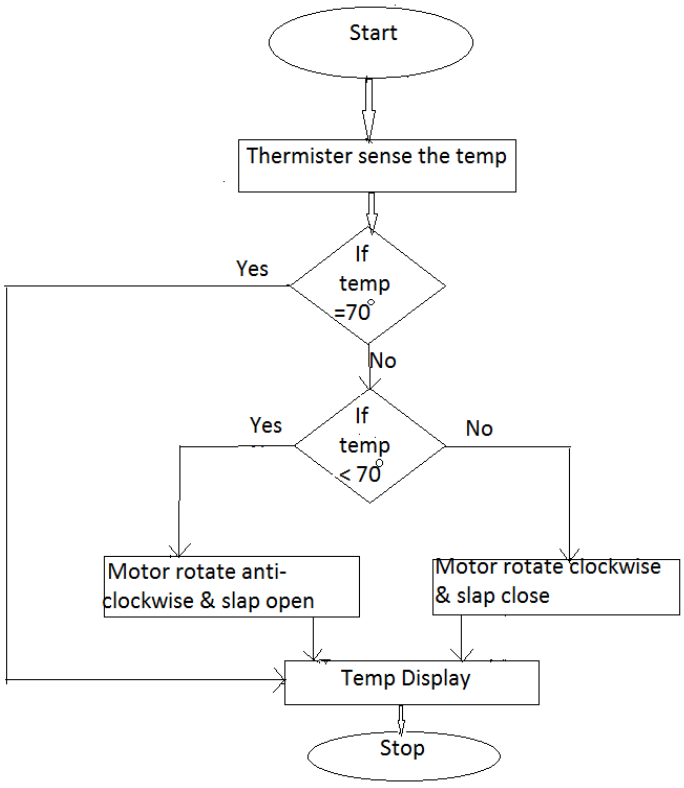

Figure6. Flowchart

The thermistor continuously senses the temperature. As temperature is equals to the set point that is 70 degrees then the process is ok. As the temperature decreases below the set point the motor rotates anticlockwise which in turn causes the aperture plate to open and if temperature increases above the set point the motor rotates clockwise which causes the aperture plate or slap to close. At the end the accurate temperature sensed by the thermistor is displayed on the lcd display.

VI. RESULT

The output of the NTC thermistor is analog. The resistance of the thermistor decreases with increase in temperature.

Sr. no	Temperature (degree)	Resistance(K ohm)
1	45	21.47
2	50	18.23
3	55	14.91
4	60	12.40
5	65	10.41
6	70	08.76
7	75	07.30
8	80	06.49
9	85	05.52
10	90	04.59
11	95	03.83

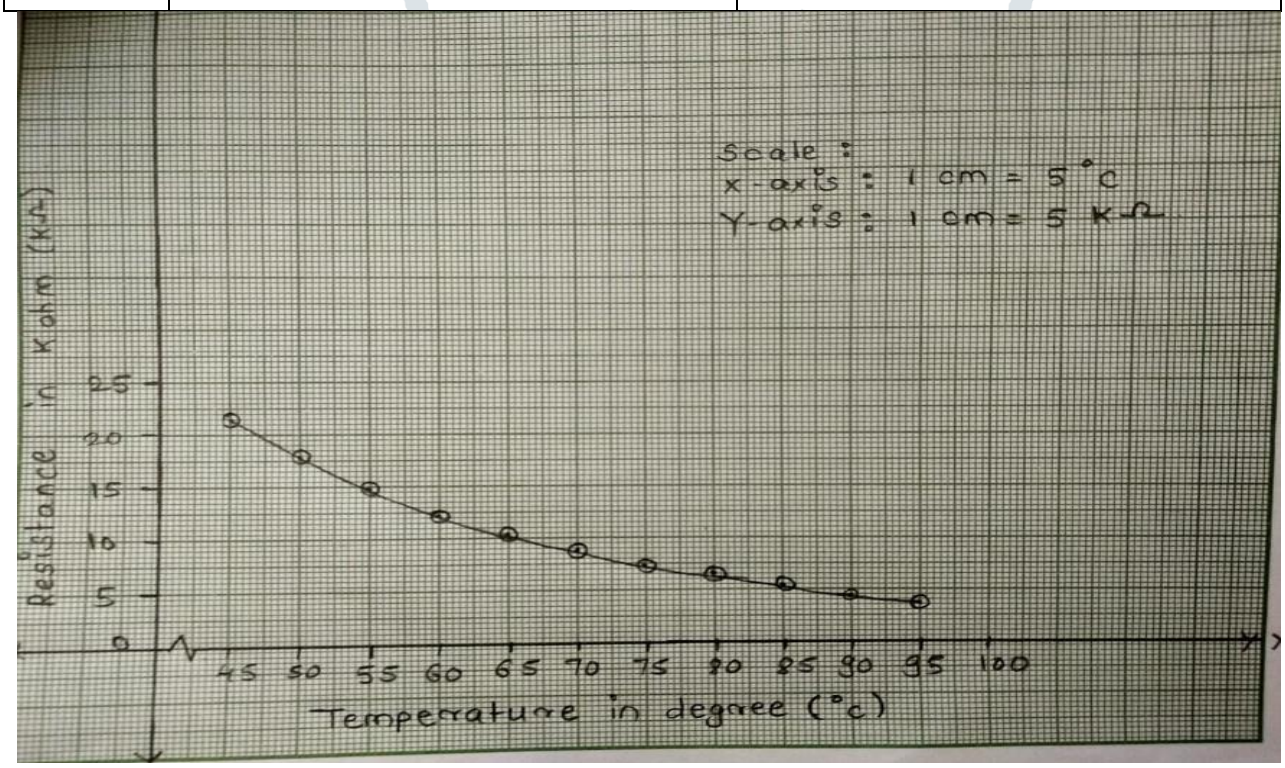

Figure7. Thermistor Output

VII. CONCLUSION

The purpose of the project is to control the temperature at the specific set point is successfully achieved.the set point is 70 degree. When temperature rises above that set point the aperture plate is closed and when temperature goes below the set point the aperture plate opens and the temperature is maintained constant. The sensor thermistor gives the accurate readings of the temperature whose resistance decreases with increase in temperature.

ACKNOWLEDGMENT

First and foremost, I thank the almighty God for guiding me throughout my studies till the accomplishment of this project. I am grateful to my supervisor, Dr.M.S.Chavan for the useful guidance and suggestions throughout the project; it has been a great pleasure for me to get an opportunity to work under him. A project of this nature could never have been attempted without reference to and inspiration from the works of others whose details are mentioned in reference section. I also acknowledge all of them. Lastly, my thanks goes to all of my lecturers, classmates and friends in the department of Electronics and Telecommunication Engineering at the University of shivaji who extended all sorts of help to the accomplishment of this undertaking

REFERENCES

[1] C. Y. Lin, M. Wu, J. A. Bloom, I. J. Cox, and M. Miller, "Rotation, scale, and translation resilient public watermarking for images," IEEE Trans. Image Process., vol. 10, no. 5, pp.,767-782, May 2001.

[2] J. U. Duncombe, "Infrared navigation—Part I: An assessment offeasibility," IEEE Trans. Electron Devices, vol. ED-11, pp.34-39, Jan. 1959.

[3] Chhada, K.L. S.D., Shikhamani, (2011). The grape – improvement , production and post-harvest management, Malhotra Publishing House, New Delhi, India.

[4] Gawade, B.J., Jadhav, M.S. and Nimbalkar, C.A. (2003). Effect of different methods of raisins making from giberelic acid treated Thomson seedless grapes on quality of raisins in storage. Journal of Soil and Crops, 13 (1):101-107.

[5] Ismile, O., Keyf, S., Beyribey, B. and, Corbacioglu, B. (2008). Effect of dipping solutions on air-Drying rates of the seedless grapes. Food sci. Technol. Res.,14(6),547-552.

[6] Thermistor datasheet

[7] ADC0808 and microcontroller 89C52 datasheet

REFERENCE