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Spontaneous Fan Speed Control System using Arduino

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Abstract: ***As we all know that we are slowly moving toward automation and Automation is one of the trending topics. So basically in this project we will be basically controlling fan speed with respect to the temperature. The system will get the temperature from the temperature Sensor and it will control the speed according to the temperature, set by the user. In this project, microcontroller forms the processing part, which firstly senses the temperature and the controller then compares the data with the set temperature. If the current temperature is greater than the set temperature, the controller turns ON the fan and the set speed will be proportional to the difference between between the set temperature & the current temperature. If the current temperature is less than the set temperature, the fan will be turned OFF .The fan's speed will change according to the temperature.***

Keywords: Microcontroller, speed, temperature, Liquid Crystal Display(LCD), sensor he set temperature & the current temperature. If the current temperature is less than the set temperature, the fan will be turned OFF .The fan's speed will change according to the temperature.

I. INTRODUCTION

Electric fan is one of the most popular electrical devices due to its cost effectiveness and low power consumption advantages. It is a common circuit and widely used in many applications. It is also one of the most sensible solutions to offer a comfortable and energy efficient. In fact, the fan has been long used and still available in the market.

Fan can be controlled manually by pressing on the switch button. Where in this method, any change in the temperature will not give any change in the fan speed. Except the usage change the speed of the fan which is manually. So, an automatic temperature control system technology is needed for the controlling purpose in the fan speed according to the temperature changes.

II. FAN SPEED CONTROL SYSTEM COMPONENTS

The arduino is the heart of the system. It accepts inputs from the temperature sensor, LM35 which allows for the measurement of the current room temperature, then the controller will give the action to maintain the required fan speed. LCD is used to display the fan speed and room temperature. All of these can be summarized in a diagram as shown in Fig. 1.

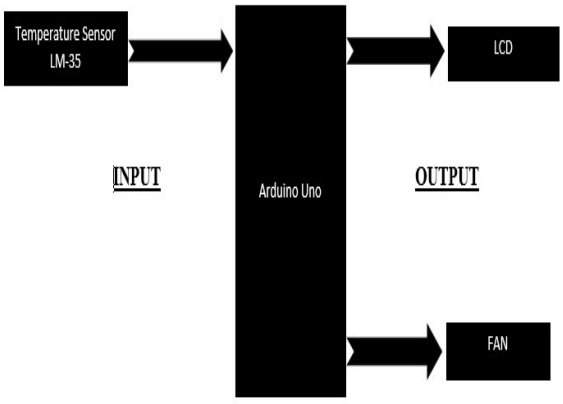


Fig. 1 Block diagram of fan speed control system

A. Arduino (Microcontroller)

A microcontroller is a computer control system on a single chip. It has many electronic circuits built into it, which can decode

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written instructions and convert them to electrical signals. The microcontroller will then step through these instructions and execute them one by one. As an example of this a microcontroller could be used to control the fan speed according to the temperature of the room.There are different types of microcontroller, this project focus only on the Arduino Uno Microcontroller where its pin diagram is shown in fig.2

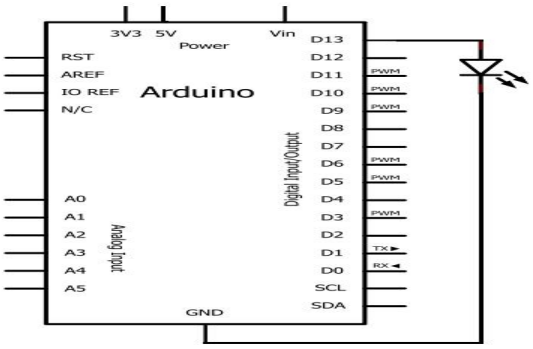
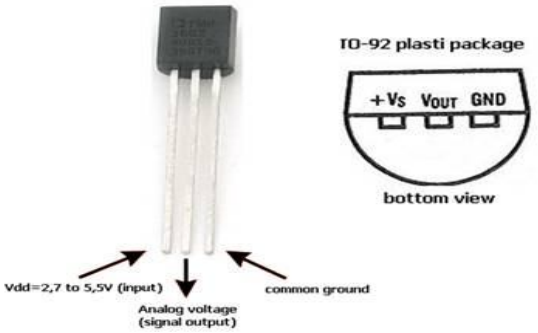


Fig. 2 Pin diagram of Arduino

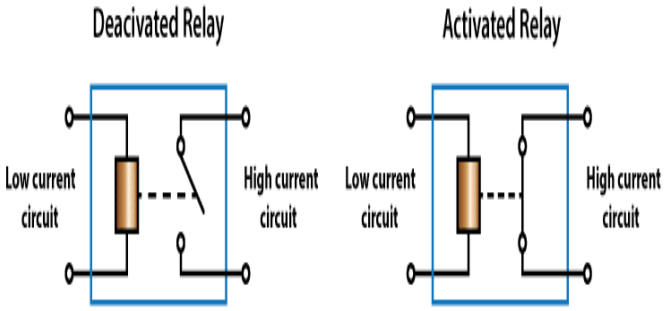
B. Temperature Sensor(LM35)

The LM35 is an integrated circuit sensor that can be used to measure temperature with an electrical output proportional to the temperature (in °C).It can measure temperature more accurately than a using a thermistor. The sensor circuitry is sealed and not subject to oxidation. The LM35 generates a higher output voltage than thermocouples and may not require that the output voltage be amplified. The LM35 has an output voltage that is proportional to the Celsius temperature.



C. Relay (4 Channel,5V)

We can control High Voltage electronic devices using relays. A Relay is actually a switch which is electrically operated by an electromagnet.The electromagnet is activated with a low voltage, for example 5 volts from a microcontroller and it pulls a contact to make or break a high voltage circuit.



D. Liquid Crystal Display (LCD)

This component is specifically manufactured to be used with microcontrollers, which means that it cannot be activated by standard

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IC circuits. It is used for displaying different messages on a miniature liquid crystal display. it can display messages in two lines with 16 characters each. Also it can display all the letters of alphabet, Greek letters, punctuation marks, mathematical symbols etc. Fig. 3 illustrates LCD (2 x 16 characters) and its connection

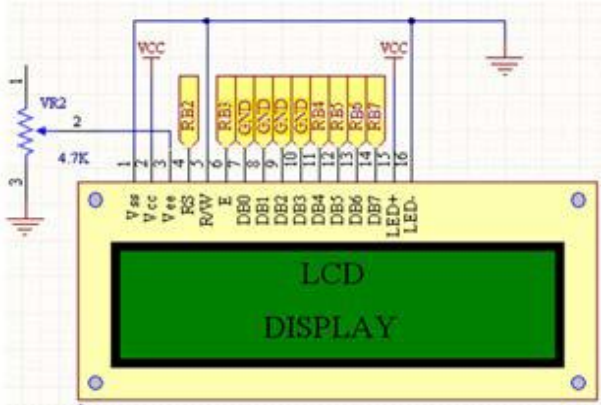


Fig. 3 LCD Display

III. FAN SPEED CONTROL SYSTEM CIRCUIT DESIGN

This section describes how the speed of fan is controlled by output from microcontroller, with the change in room temperature. The diagram of fan speed control system shown in Fig. 4, 5

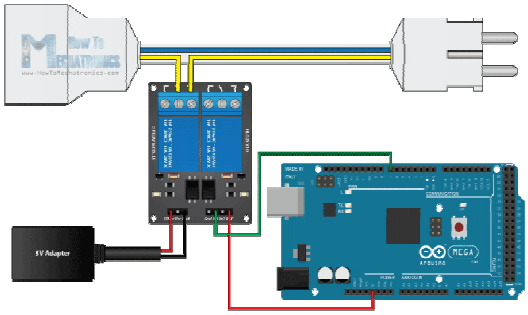


Fig. 4 Relay and Arduino connection

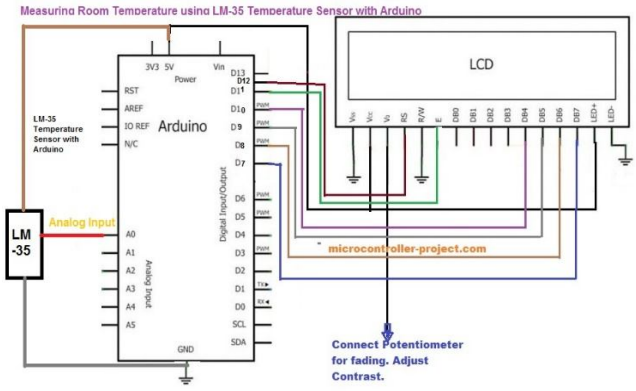


Fig. 5 LM35 and LCD connection with Arduino

In these circuits the microcontroller is used to control the fan according to the temperature variation. The LM35 functions to measure the changes of temperature surrounds the area. All the operations are controlled by the arduino to produce the output. The LCD, fans are the output where they are set with the pseudo code.

A. Algorithm

1) Set T=0,fanSpeed=0 and led=off

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2) T=getTemp() // Get current temperature from temperature sensor(i.e., LM 35)
3) Now compare the value of T with range of temperatures and set the fanSpeed according to that
a) if T >= 25^0C and T <=30^0C
fanSpeed = 25%
b) if T >30^0C and T <=40^0C
fanSpeed = 50%
c) if T>40^0C and T <=45^0C
fanSpeed = 75%
d) if T >45^0C
fanSpeed = 100%
led=On

B. End

The LCD is used to measure and show the changes of temperature value. As working principle, the temperature sensor senses the room temperature and displayed it on the LCD. The speed of the fan is controlled according to the room temperature change.

IV. RESULTS AND CONCLUSION

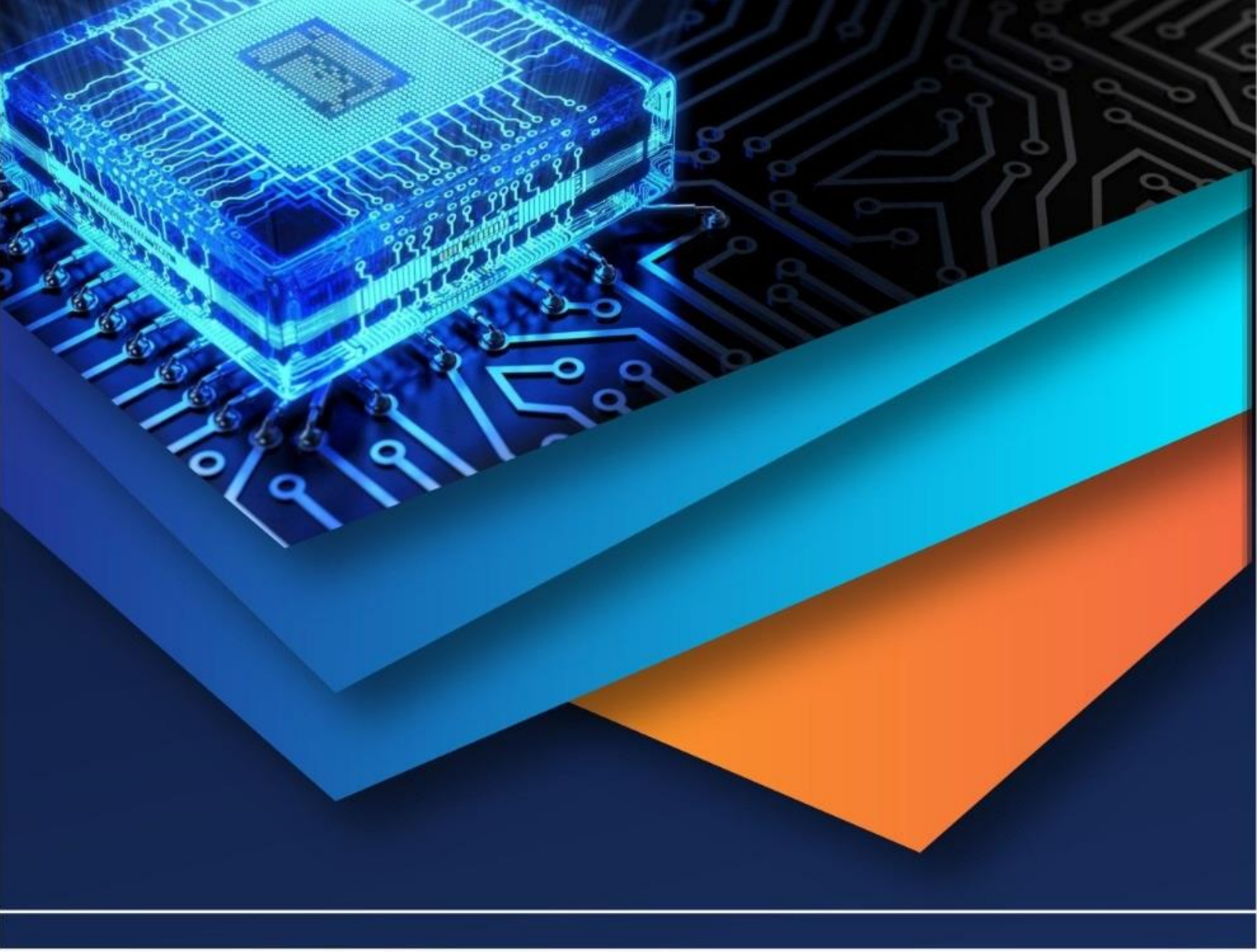
This paper elaborates the design and construction of fan speed control system to control the room temperature. The temperature sensor was carefully chosen to gauge the room temperature. Besides, the microcontroller had been used to control the fan speed using the fan speed in rpm and the arduino was successfully programmed using C/C++ Language to compare temperature with standard temperature and set fan speed and their values displayed on LCD.

Moreover, the fan speed will increase automatically if the temperature room is increased. As conclusion, the system which designed in this work was perform very well, for any temperature change and can be classified as automatic control.

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