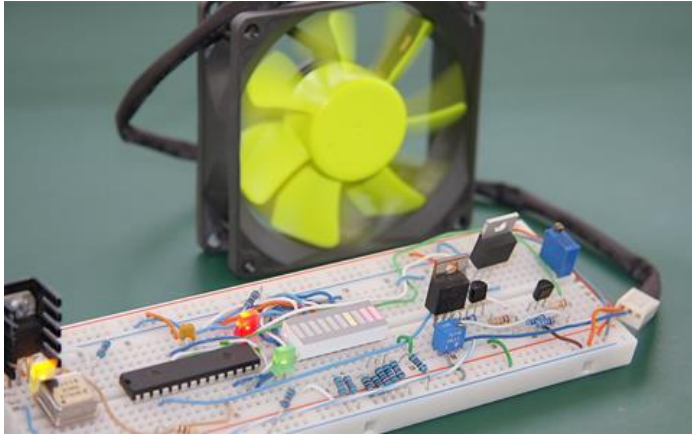# Temperature Controlled DC Fan using Microcontroller

The proposed system temperature-controlled fan using a microcontroller is used to control the speed of the fan according to the temperature and specify the temperature in the display. The required components are microcontroller, temperature sensor, motor; seven-segment display, ADC, power supply, operational amplifier.
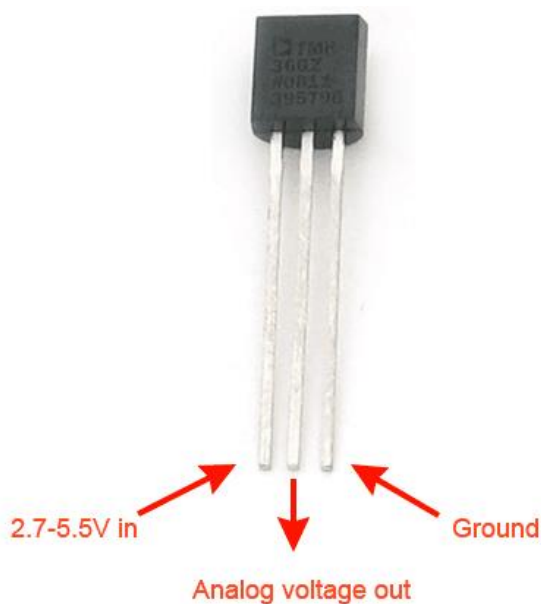

Temperature Controlled DC Fan

The block diagram of the temperature-controlled fan using a microcontroller is shown in the above figure. The block diagram includes power supply, RST circuit, 8051 microcontrollers, LM35 temperature sensor, 8 bit ADC, L293D motor driver, DC motor, 7-segment display, i/p switches.

Temperature Sensor

The temperature sensor used in the proposed system is LM35. The o/p of this temperature sensor is linearly proportional to the Celsius scale. This IC doesn't need any external calibration to give accuracies. The main function of the temperature sensor in the proposed system is to detect the temperature of the external environment of a fan.

Temperature Sensor

8051 Microcontroller (AT89C51)

The 8-bit microcontroller AT89C51 belongs to the 8051 families. It consists of 128 bytes of RAM, 16-bits of addresses, 16-bit timer/ counter-2, 6 interrupts ROM- 4k bytes. The main function of the microcontroller in the proposed system is to analyze the temperature which is sensed by the temperature sensor. Based on the temperature, the microcontroller should change the speed of the fan.
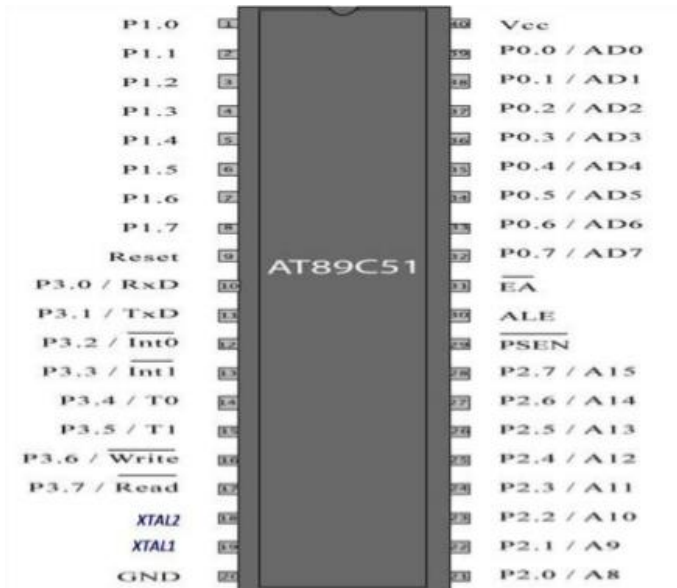

AT89C51 Microcontroller

ADC (0808)

An ADC (analog to digital converter) needs to be interfaced with 8051 microcontrollers to allow analog i/p for the processing of data. Here serial I/O port is used to make the flow of data between controllers and also other devices. Here, an 8 bit parallel ADC0808 IC has been used. It works with +5V and has an 8-bit resolution. This ADC converts the input analog signal into an equivalent digital signal by using the reference voltage.

ADC0808

Seven Segment Display

A 7-segment display is one kind of electronic display used for displaying the decimal numerals. The applications of these displays mainly include electronic meters, digital clocks, and various electronic devices for displaying the information in the form of numerical. But these displays use hex code for displaying alphanumeric code.
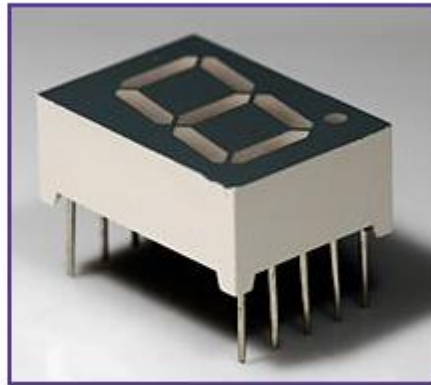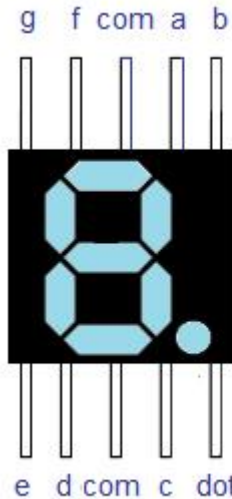
7-Segment Display
Temperature Controlled DC Fan Working

All the modules used in the above block diagram are integrated. The fan speed can be monitored by the variation of temperature. The basic concept of this project is to getting the temperature, displaying the temperature, and temperature change is reflected as vary in fan's speed. Here temperature sensor used in the project is LM35 and the o/p of this sensor is given to analog to digital converter. The complete working is allowed or not can be decided by external interrupts.
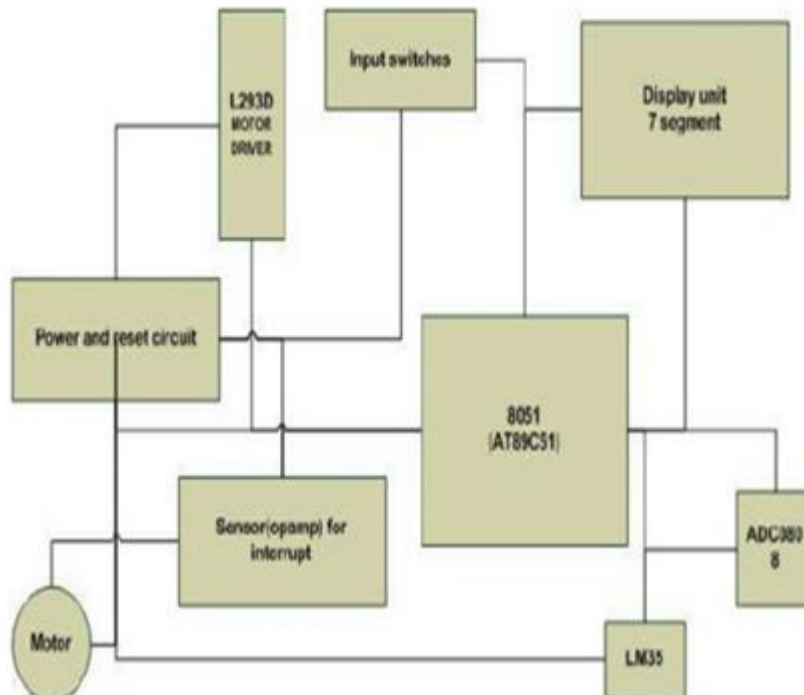
Temperature Controlled DC Fan Block Diagram

Temperature sensor LM35 is interfaced with the 8051 microcontroller's analog pin because temperature sensor changes temperature into voltage. Here temperature sensor should be interfaced correctly to the microcontroller to get the correct reading. The speed of the fan can be decided by the temperature examine by the microcontroller.

The microcontroller controls the DC fan using the IC L293D motor control. This IC L293D is a dual H-bridge motor driver used to control the speed and direction of DC motor. It also offers isolation between microcontroller and motor. Motor speed can be controlled by using the pulse width modulation (PWM) technique.

The proposed system is also provided with auto or manual switch which gives the option to users to control the speed of the fan. When the button is pressed, the speed can be controlled manually which means the user can control the fan speed manually. An LED can also be connected at RC1 to demonstrate the status of auto or manual switch. If the light-emitting diode is blinking, it means the fan control is manual.

So finally we can conclude that when the power supply is given to the entire circuit then the microcontroller reads the surrounding temperature of the fan. The analog value of the temperature is given by the sensor and applied to the ADC pin of the microcontroller. The value of analog is changed to the digital by the microcontroller internally. If the temperature is superior to the threshold value, then the microcontroller sends a signal to the controller to turn ON the motor. Thus the fan starts rotating.

Properties of Temperature Controlled Fan

The properties of a temperature-controlled fan mainly include the following

- When the temperature surpasses 35 $^\circ$ C then the fan should run at max speed.
- When the temperature drops below 15 $^\circ$ C then the fan should be at min speed.

- The fan speed should be changed according to the ranges of temperature from 15 ^{o} C to 35 ^{o}C,
- The auto-manual switch should be built-in which would give the user the freedom to control the speed of the fan on manual or auto.

The applications of the temperature-controlled fan include where the consumption of power has to be controlled such as firms, institutes, organizations, home appliances, in computers to cool the processor. Furthermore, this project can be enhanced by interfacing with air conditioners.

Thus, this is all about temperature controlled fan using microcontroller. We hope that you have got a better understanding of this concept. Furthermore any queries regarding this concept or microcontroller based projects, please give your feedback by commenting in the comment section below. Here is a question for you, what is the function of the 7-segment display?