University of Nevada Las Vegas

Arduino Project Report: Fan Speed Control as a Function of Thermistor

EE 290

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Are you among the three hundred million people in this country that turns on a fan at night to feel the cool crisp air when you’re sleeping? Also use it as white noise? But in all in the while you turn on your air conditioner then it becomes really cold in the middle of the night. But your too tired to get up to turn down the speed of you fan. Don’t fear because the fan speed control as a function of temperature is here. How would you like your fan to slow down its speed as the temperature lowers and increase its speed as the temperature goes up? Well, then you’ll be happy with this sustaining product. It is sustaining because it uses less power when it slows down when the temperature is below a certain degree so you use energy wisely.

The circuit contains a Negative Temperature Coefficient (NTC) Thermistor sensor whose property includes increasing resistance when temperature is decreased, two nine volt batteries, couple wires, a fan, and an arduino board. The arduino board is programmed to read the analog input, the thermistor, and respond accordingly by controlling the speed of the analog output, the fan. If the temperature goes down, the resistance of the thermistor increases thereby increasing the voltage drop across it and that is picked up by the arduino that will decrease the speed of the fan. Furthermore, if the temperature goes up, the resistance of the thermistor decreases thus decreasing the voltage drop across it and that is picked up by the arduino that will increase the speed of the fan. This process is sustainable, maintaining the on state while using less energy during low speeds.

On the arduino, the thermistor sensor, or analog input, is connected to analog input pin 4 with five volts supplied to it. The fan is connected to a nine volt battery with a diode around it and is connected to the arduino through a transistor to digital output PWM pin 9. The program is setup to where if the value, or voltage, of the thermistor is read from 0 to 5 volts, or 0 to 1023 integer values, then according to that value through pulse width modulation the fan’s speed is
controlled with the duty cycle ranging from 0, always on, to 255, always on, or a 0 or 1 in digital logic with a delay of milliseconds in between. If the value of the thermistor is more than 850, then the fan operates at 100 duty cycle. If the value of the thermistor is less than 850, then the fan operates at 255 duty cycle. Schematics of the circuit, a screen shot of the program, and a couple of diagrams of the circuit are displayed below.

The circuit shown includes, the fan, thermistor, arduino microcontroller,
Below the circuit shown includes the transistor, diode, and arduino microcontroller.

Below is the schematic of the circuit.
int fanPin = 9;               // FAN connected to digital pin 9
int tempsensor = 4;
int val = 0;

void setup() // run once, when the sketch starts
{
    pinMode(fanPin, OUTPUT);  // sets the digital pin as output
    Serial.begin(9600);
}

void loop() // run over and over again
{
    val = analogRead(tempsensor);
    delay(5000);
    Serial.println(val);
    if (val > 850)
    {
        analogWrite(fanPin, 100);
    }
    else
    {
        analogWrite(fanPin, 255);
    }
}