Tyler Crowley

CS300

Tireman

22 April, 2022

Final Project Writeup

The purpose of this project was to create a self-regulating fan to cool a thermistor variable-resistor being heated by a second resistor placed just below it. An Arduino takes in an input reading from the thermistor and, using a set of assembly instructions that compares the input to a preset reference voltage representing the desired temperature for the thermistor, adjusts the fan's speed accordingly. It then sends the new signal frequency to a circuit which turns the Arduinos 5V output into a matching 12V signal to run the fan, whilst simultaneously outputting the voltage through a pair of BCD Encoders to a set of 7 segments displays, as an ASCII code. In the code, the user can set the minimum and maximum speed of the fan using minDutyCycle and maxDutyCycle, as well as change the temperature of the thermistor through the variable input running through the resistor underneath it.

Fan Circuit:

The wire from Digital Pin 4 runs through a 100Ω resistor, then splits into 2 transistors, the top one runs up to the fan and joins with the 12V power supply, the bottom one leads to ground. Both meet in the middle run through a 10Ω resistor into a MOSFET, which runs one end to ground, and the other into the ground wire of the fan. Between the 2 fan wires is the schottky diode, which runs from the ground to positive wires, and serves as a discharge spot for any leftover power when the circuit is turned off. The thermistor runs from power into a 10kΩ

resistor, between the two is also the wire which runs to Analog Pin 0 on the Arduino, the resistor then runs to ground. The 150Ω resistor acts as your heat source, this runs from a variable input set at ≈20V, to ground. The thermistor should be on top of and touching this resistor for it to heat up properly.

Voltage Output:

Port C on the Arduino (pins 30-37) should run through a pair of BCD Decoders. Pin 30 should connect to input D of your left or highest significance display's decoder, and pin 37 should run into input A on your least significant one. The rest fall between the two in their logical order. The output should all be run through a generic resistor pack, so as to not blow out the LEDs, then into their respective input on the 7 segment displays.

Parts List:
1 x Arduino Mega 2560
1 x 12V Fan
1 x Thermistor
2 x BCD Decoders
2 x Resistor Packs
2 x 7-Segment Displays
1 x MOSFET
2 x Transistors
1 x Schottky Diode
1 x 10,000Ω Resistor
1 x 150Ω Resistor
1 x 100Ω Resistor
1 x 10Ω Resistor
1 x 5V DC Power Source
1 x 12V DC Power Source
1 x Variable DC Power Source
A lot of wires