EMBEDDED SYSTEMS DESIGN

Topic: Digital Temperature Sensor Circuit

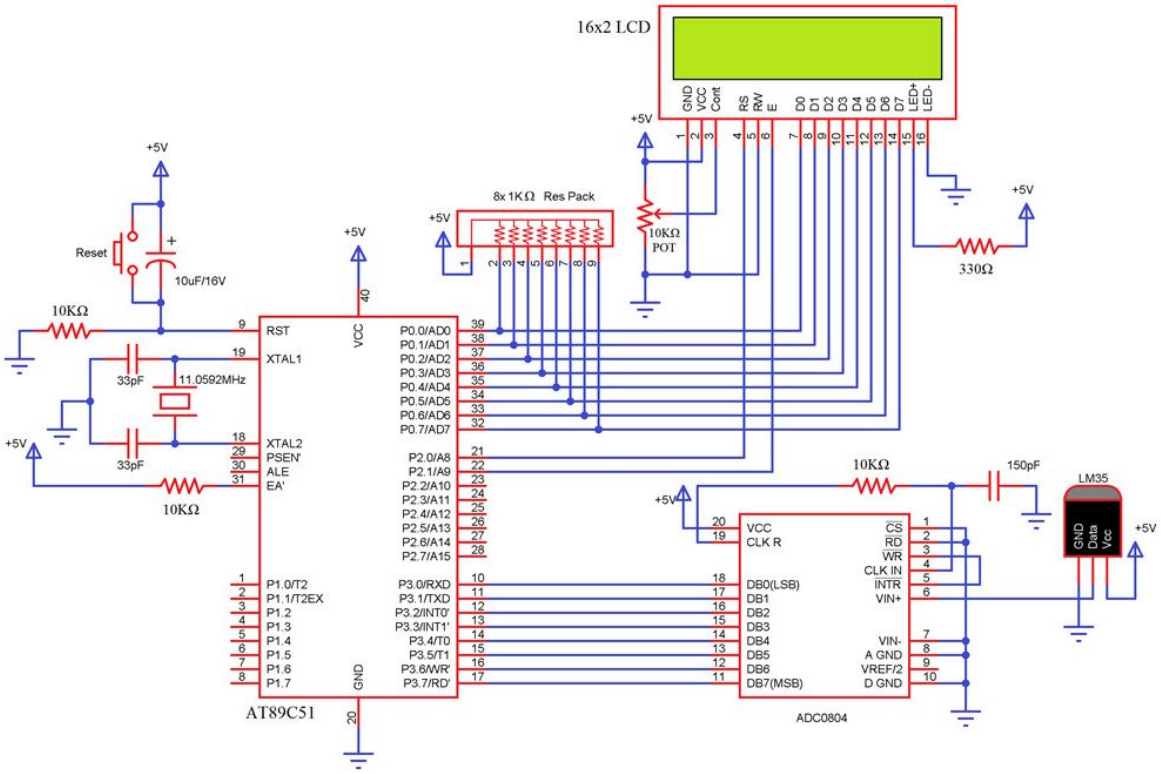
Objective:

This project aims to design the hardware for a temperature sensor circuit using the 8051 microcontroller. The main principle of this circuit is to take the analog temperature values, convert them into digital values and display any warnings or safety levels on a LCD or 7-Segment Display.

Hardware:

Here, 8051 microcontroller is used. In case of 8051 Microcontroller (AT89C51 is used in this project), it doesn't have any built-in ADC . Hence, we are going to interface an external ADC IC ADC0804 with 8051 Microcontroller to convert the Analog temperature values to digital values. The digital out pins of the ADC IC are connected to PORT3 Pins of 8051. PORT0 pins are pulled-up using 1KΩ Resistor pack and they are connected to the data pins of 16x2 LCD. P2.0 and P2.1 of 8051 are connected to RS and E of LCD. LM35 is connected to Analog In pin VIN+ (Pin 6) of ADC0804. After making all the connections and burning the code onto the 8051 Microcontroller, turn ON the power supply. The LM35 Temperature Sensor provides the Analog Temperature Data to ADC0804, which it converts into Digital Values and sends to 8051. Upon receiving the digital values, the 8051 Microcontroller performs a small calculation and after a series of control flow statements display the Danger level on the seven segment display or LCD.

Hardware Diagram:



Software Flow Diagram:

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Components:

- AT89C51 (8051 Microcontroller)
- 11.0592 MHz Cystal
- 2 X 33pF Capacitor
- 10µF/16V Capacitor
- 3 X 10KΩ Resistor
- 1KΩ x 8 Resistor Pack

- 10KΩ POT
- 16X2 LCD Display
- ADC0804
- LM35
- 150pF Capacitor
- 330Ω Resistor
- Power Supply
- Connecting Wires
- 8051 Programmer