United International University
QUEST FOR EXCELLENCE

Department of Electrical and Electronic Engineering

Project Proposal : Digital Thermometer

Submitted To

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Course Title: Digital Electronics Laboratory
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Section: A

Purpose:

The purpose of a digital thermometer project is to design and create a device capable ofmeasuring and displaying accurate temperature readings in a digital format.

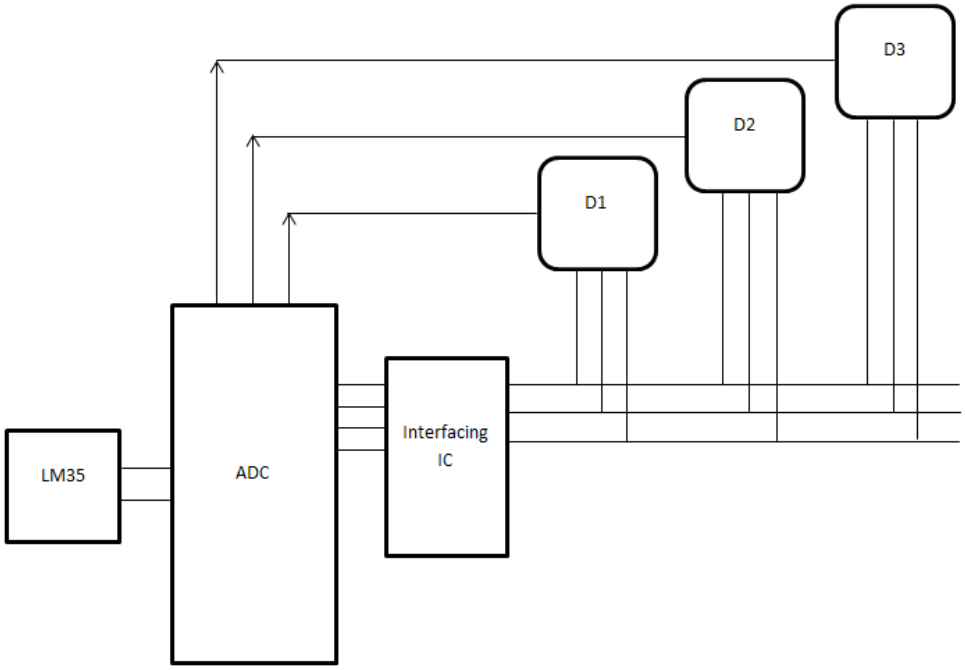
1. The primary purpose of a digital thermometer is to measure and display temperature accurately. It can be used in various settings, such as homes, offices, laboratories, andindustries, to monitor and control temperature conditions.
2. It provides temperature readings in numerical form, making it easy for users to read and understand the temperature without interpreting a traditional mercury or alcohol-based scale.
3. It can offer higher precision and accuracy in temperature measurements compared toanalog thermometers.
4. It typically has a quick response time, providing almost instant readings, which canbe important in certain applications where quick temperature changes need to be monitored.
5. It can be designed to be small and portable, making them convenient for variousapplications, including medical, weather monitoring, and more.
6. These are widely used in healthcare settings for monitoring body temperature, makingthem essential tools for diagnosing and tracking illnesses.

Overall, it provides a practical way to measure and display temperature accurately, which isuseful in a wide range of scenarios and industries.

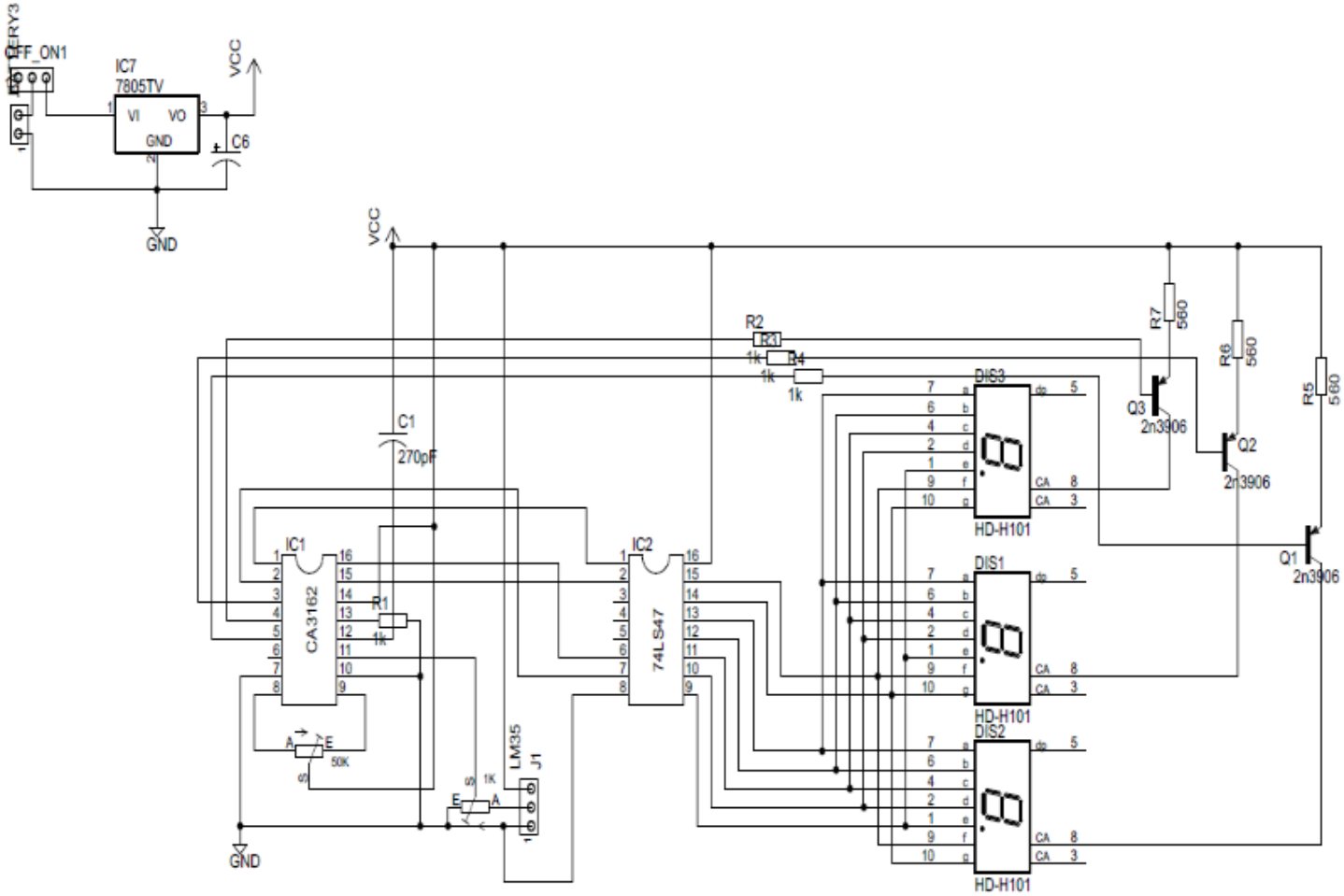
Components:

1. 1x CA3162
2. 1x LM35
3. 1x 50k pot
4. 1x 1k pot
5. 1x 74LS47
6. 3x 1k resistor
7. 3x Seven segment display
8. 3x 2n3906 transistor
9. 3x 560 resistor

Block Diagram:

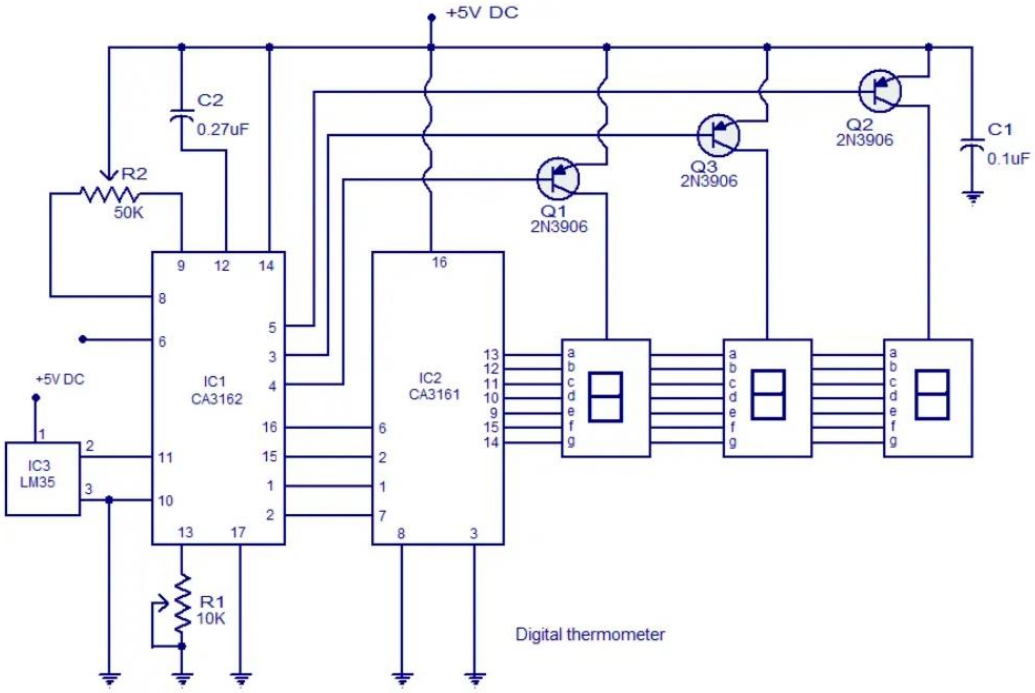


Circuit Diagram 1 :



Circuit Diagram 2 :

Circuit diagram.



Digital thermometer circuit

Working of Digital Thermometer:

1. The LM35 temperature sensor produces voltage in direct proportion to the temperature. Two transistors are placed inside the temperature sensor. The current through one transistor is reduced by one-tenth because it has an emitter area that is ten times greater than that of the other. There will be a voltage across the transistor's resistance since the current flowing through the two transistors is identical and matches the absolute temperature. It has circuitry built in to fix light bit value discrepancies. It has an amplifier that will convert the Kelvin-based absolute temperature to Celsius.

2. The voltage across the diode will rise when our finger is placed over the LM35 temperature sensor, depending on the temperature rising at a known rate. Actually, the voltage that has been generated across the transistor's base and emitter is what has caused this voltage drop.

3. The term "potentiometer" refers to a variable resistor. Here, it serves as a calibrating tool. While taking the reading, the room temperature will be calibrated. Accordingly, the pot will be set.

4. Here, a 4-bit ADC, model CA3162, is used as an ADC (analogue to digital converter). A corresponding BCD code will be generated from the temperature sensor's value. The 8th and 9th pins of this IC are connected to a potentiometer. This is done to control the voltage across it.

5. A seven-segment display will use an interface IC to display the value in Celsius. The 74LS47 interface chip is being used in this instance, and it will be transforming the generated BCD code i nto a pattern for the seven-segment displays to display. The three seven-segment display unit is coupled to three transistors. These 2n3906 transistors have switching functions. The transistor will decide which of the MSB, NSB, and LSB to use.

In other words, when our finger is placed on the sensor, a matching voltage is produced, which is then converted to a BCD code. This code will be converted by an interface IC so that it can be displayed on a seven-segment display.

Why would customer buy Digital Thermometer?

6. Digital thermometers are known for their high accuracy and precision in temperature measurement. Customers who require reliable and consistent temperature readings, such as professionals in scientific research, medical settings, or industrial processes, would be interested in such a project.

7. Digital thermometers often provide quick and easy-to-read digital displays, making them user-friendly and convenient. Customers looking for a hassle-free way to monitor temperature, especially in home environments, might prefer a digital thermometer.

8. Customers who require temperature measurement as part of a larger system or project may seek digital thermometer solutions that can be customized and integrated into their existing setups.

9. Digital thermometer projects can be valuable tools for educational institutions, helping students learn about temperature measurement, sensor technology, and data analysis.