

MICROCONTROLLERS LAB PROJECT

DIGITAL THERMOMETER USING 8051
MICROCONTROLLER

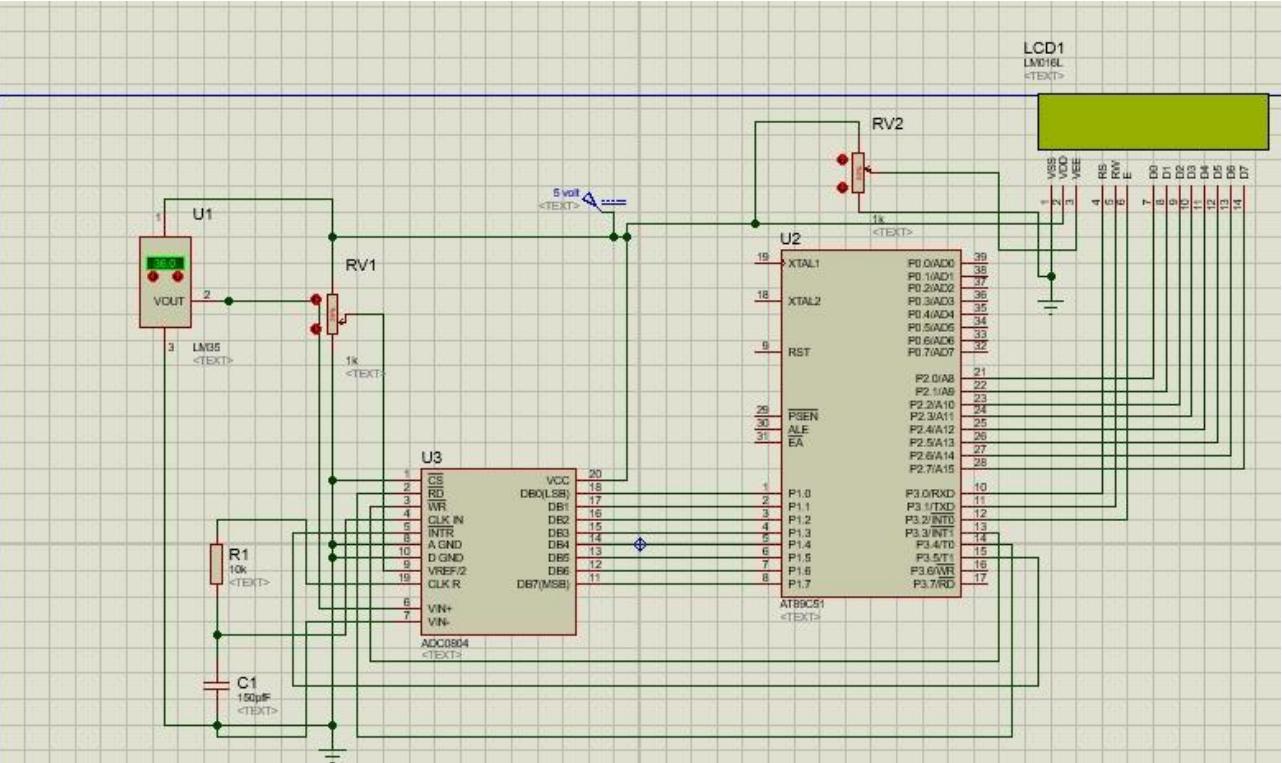


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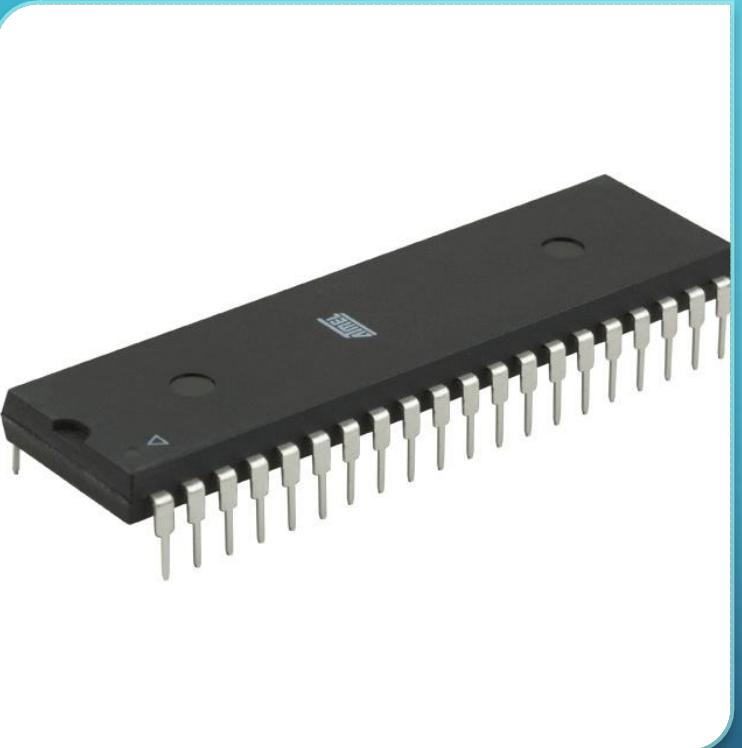
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OBJECTIVE OF THE PROJECT

- The primary objective of this project is to design and implement a digital thermometer system using the 8051 microcontroller. This system will accurately measure temperature and display it on an output interface, providing an efficient and user-friendly solution for temperature monitoring.

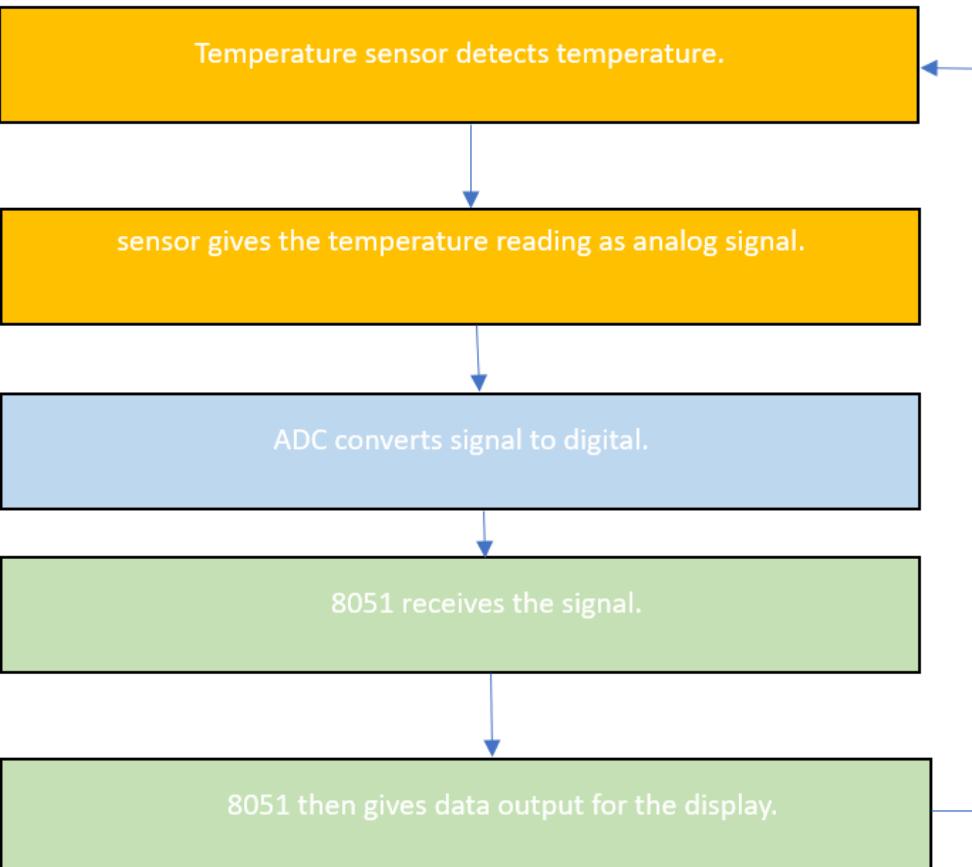


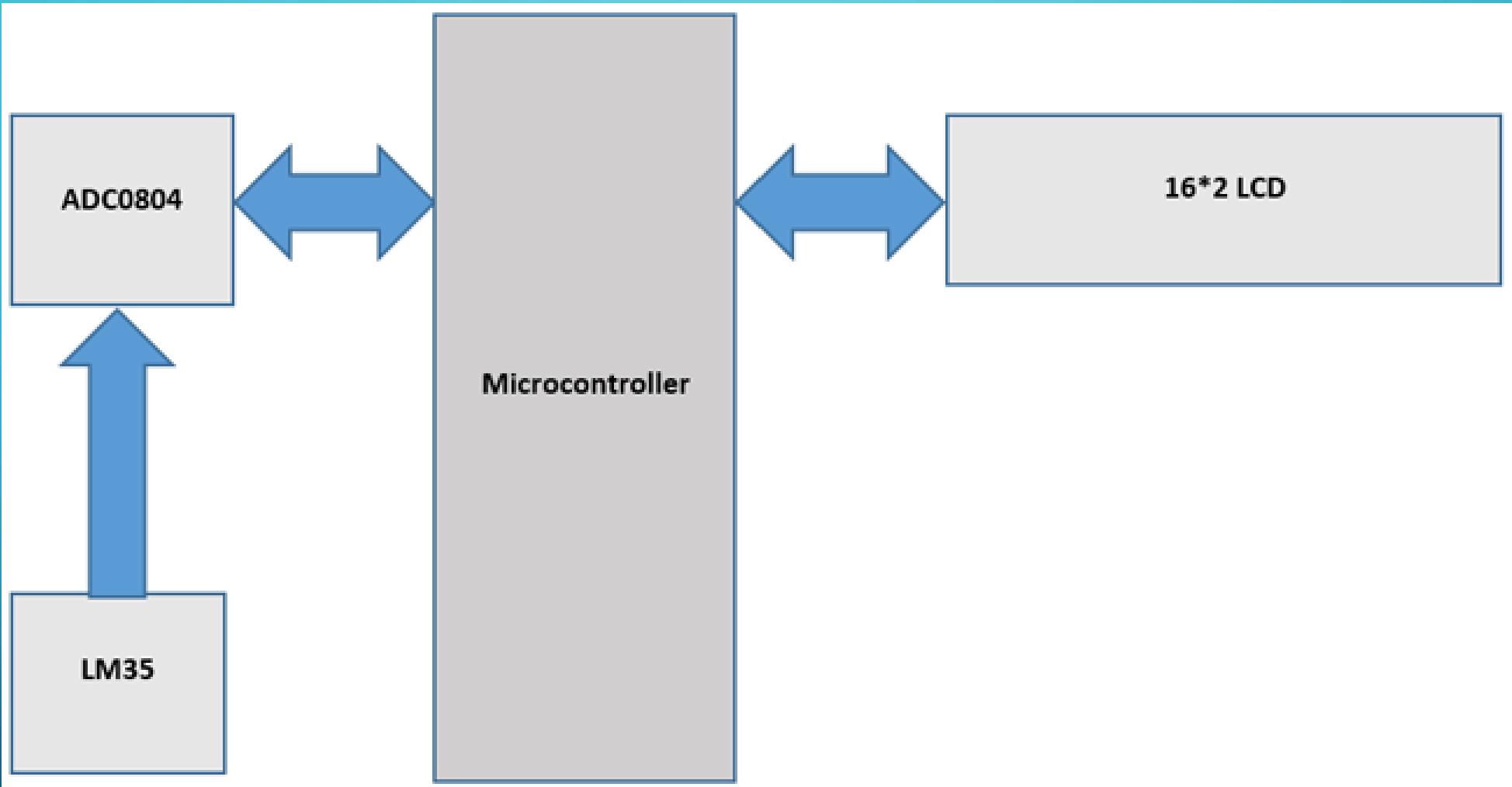
INTRODUCTION TO THE PROJECT



- Digital thermometers have become essential for various applications, from healthcare to industrial settings. The significance of this project lies in its practicality, offering a precise and reliable means of temperature measurement. This report will discuss the methodology, hardware and software requirements, implementation, and the impact of this project on society and the environment.

METHODOLOGY (FLOWCHART)





Hardware Interfacing Diagram

HARDWARE DESIGN REQUIREMENTS SPECIFICATIONS

8051	x1
Adc 804	x1
wires	As needed
16*2 LCD display	x1
LM -35 (temp sensor)	x1
potentiometer	x2
resistors	x14
crystal oscillator	x1

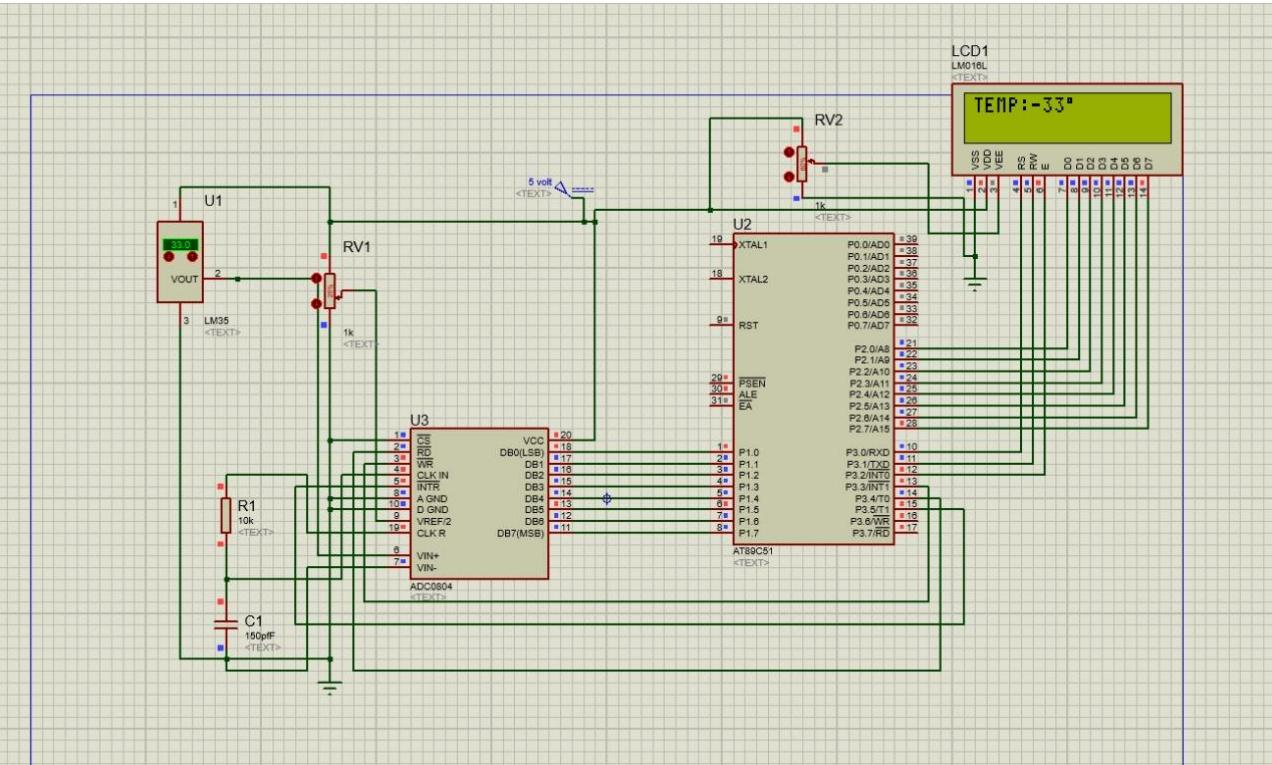


SOFTWARE DESIGN REQUIREMENTS

KEIL: WE USED KEIL TO WRITE AND COMPILE THE CODE.

PROTEUS: PROTEUS WAS UTILIZED FOR SIMULATION

IMPLEMENTATION CIRCUIT



CODING

```
#define      HEX2ASCII  00E3B0H  
  
//LABEL OPCODE OPERAND  
  
ORG 0000H  
  
LJMP MAIN  
  
ORG 0030H  
  
LOOP: MOV R0,#0FFH //delay program  
  
B0:  MOV R1,#0FFH  
  
B1: DJNZ R1,B1  
  
DJNZ R0,B0  
  
RET
```

CODING

READY: SETB P2.7 // checking lcd status

CLR P3.0

SETB P3.1

WAIT: CLR P3.2

NOP

SETB P3.2

JB P2.7, WAIT

RET

CODING

CMD: ACALL READY // lcd command input

CLR P3.0

CLR P3.1

MOV P2, A

SETB P3.2

NOP

CLR P3.2

RET

CODING

DAT: ACALL READY //lcd data input

SETB P3.0

CLR P3.1

MOV P2, A

SETB P3.2

NOP

CLR P3.2

RET

CODING

```
ORG 0200H  
  
MAIN: MOV P1,#0FFH // defining P1 as input port  
  
MOV P2,#00H  
  
MOV P3,#00100111B // initializing ADC0804  
  
SETB P3.4  
  
CLR P3.3  
  
NOP  
  
SETB P3.3  
  
NOP  
  
CLR P3.4  
  
MOV A, #38H // initializing LCD  
  
ACALL CMD  
  
MOV A, #0EH  
  
ACALL CMD
```

CODING

MOV A, #01H

ACALL CMD

MOV A, #10H

ACALL CMD

MOV A, #0CH

ACALL CMD

MOV A, #80H

ACALL CMD

NOP

MOV A, #'T' //inputting data into LCD

ACALL DAT

CODING

```
MOV A, #'E' //inputting data in LCD  
ACALL DAT  
  
MOV A, #'M'  
ACALL DAT  
  
MOV A, #'P'  
ACALL DAT  
  
MOV A, #':'  
ACALL DAT  
  
MOV A, #'-'  
ACALL DAT  
  
MOV A,P1 //taking data from ADC0804
```

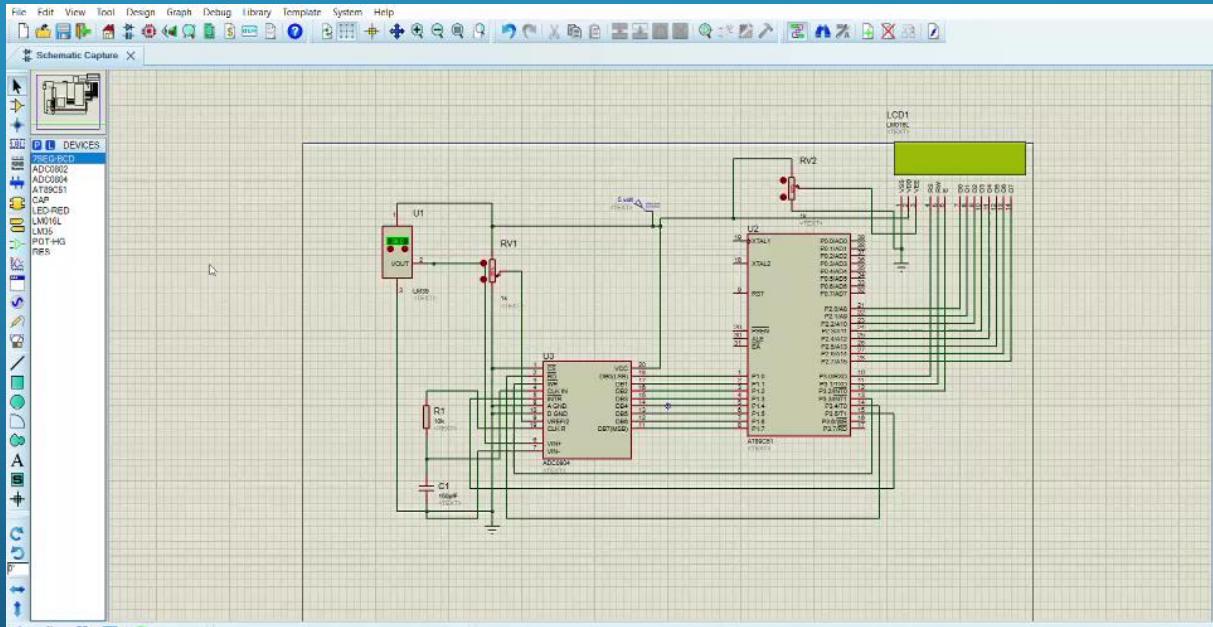
CODING

```
SWAP A  
ANL A,#0FH  
LCALL HEX2ASCII  
ACALL DAT // sending data values in ASCII format from ADC to LCD  
ACALL LOOP  
MOV A,R2  
ANL A,#0FH  
LCALL HEX2ASCII  
ACALL DAT  
MOV A, #0DFH  
ACALL DAT  
ACALL LOOP  
SJMP MAIN  
END
```

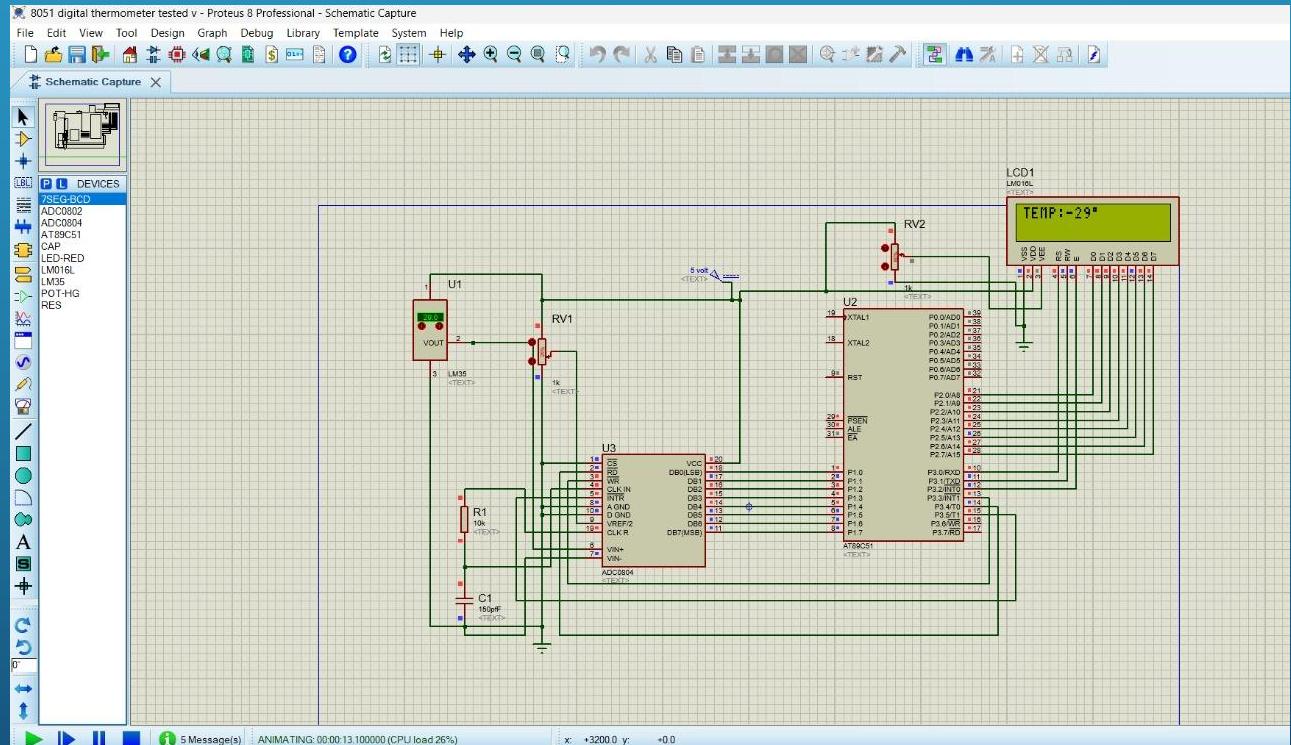
RESULTS AND INFERENCES

The project was successfully completed, and the thermometer displayed temperature accurately within 1°C resolution. We faced challenges during converting C code to ALP, but by changing the file type in Keil software, we overcame them. The project is reliable and ready for use in real-world applications.

SIMULATION VIDEO

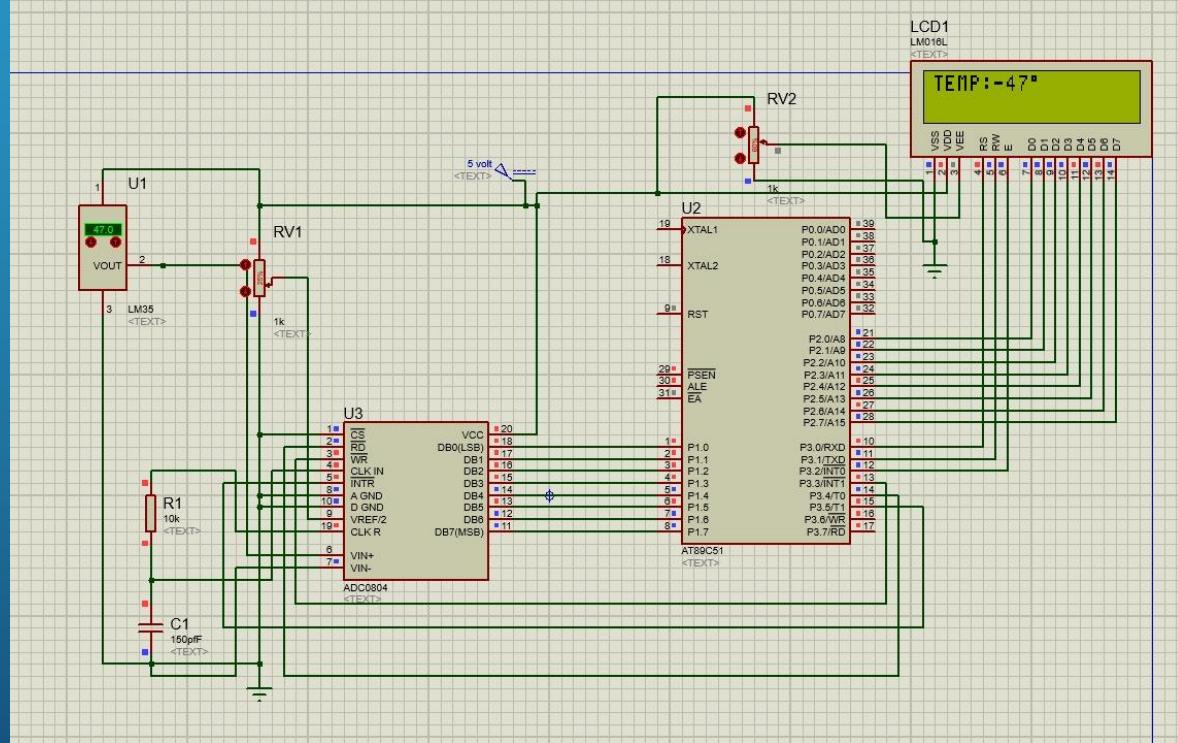


RESULTS AND INFERENCES



Output observed: 29 C

RESULTS AND INFERENCES



Output observed: 47C

IMPACT OF THE PROJECT ON SOCIETY/ENVIRONMENT

This project offers numerous benefits, including:

Accurate Temperature Measurement: Helps in healthcare, industrial processes, and research.

Reduced Energy Consumption: By maintaining optimal temperatures.

Environmentally Friendly: Fewer resources are wasted due to temperature control.

CONTRIBUTION OF INDIVIDUAL TEAM MEMBERS

Mithra Varun: Head of project application

I have worked on collecting resources – books, articles, research papers, websites, etc- to refer from and have contributed to writing the code. I worked mainly on interfacing the ADC to the 8051.

Harikishanthini: Head of Code Development

I have worked on writing the code. I mainly worked on figuring out the temperature sensor and its interfacing with the 8051 through the ADC and interfacing the LED to 8051

Ayush Chandra: Head of content ideation

I have worked on the research for the project. I came up with the idea and have collected resources. I also have helped in writing the report for the project.

Shruthi Ramprasad: Head of project management

I have worked on simulating the project in Keil and proteus. I dealt with debugging the code and fixing errors that we made. I also help in writing the project report.

FUTURE SCOPE

- Future enhancements and applications include:
 - **Wireless Communication:** Transmitting temperature data to remote devices.
 - **Data Logging:** Storing temperature history for analysis.
 - **Mobile App Integration:** Creating a user-friendly interface for smartphones.

REFERENCES

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- <https://www.circuitstoday.com/thermometer-using-8051>
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- https://www.researchgate.net/publication/346234109_Design_and_Implementation_of_a_Microcontroller_Based_Digital_Termometer
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