ADDIS ABABA SCIENCE AND TECHNOLOGY UNIVERSITY
UNIVERSITY FOR INDUSTRY

COLLEGE OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

(COMPUTER STREAM)

Microprocessors and Interfacing (ECEg 4102)

Project – 1

- **Microprocessors and Interfacing:** Interfacing LM35 temperature sensor and 20x4 LCD display with PIC microcontroller

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1. Interfacing LM35 temperature sensor and 20x4 LCD display with PIC microcontroller

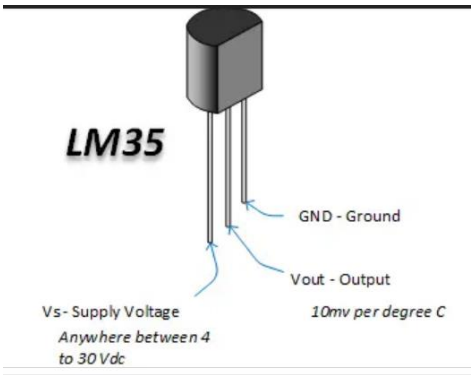
❖ This project involves interfacing an LM35 temperature sensor with a PIC18F family microcontroller to display temperature readings on a 4x20 LCD. The system displays the temperature value in the first row, "°C" in the second row, "The temperature is:" in the third row, and a descriptive message ("cold", "normal", or "hot") in the fourth row based on the measured temperature.

Description of used components

❖ **LM35**: a temperature sensor widely used in electronic projects and midrange devices.

Some features from datasheet

- Calibrated Directly in Celsius (Centigrade)
- Linear + 10-mV/°C Scale Factor
- 0.5°C Ensured Accuracy (at 25°C)
- Rated for Full −55°C to 150°C Range
- Low-Cost
- Operates From 4 V to 30 V
- Less Than 60-µA Current Drain



❖ **PIC18F4450 Microcontroller**:

Some features from datasheet

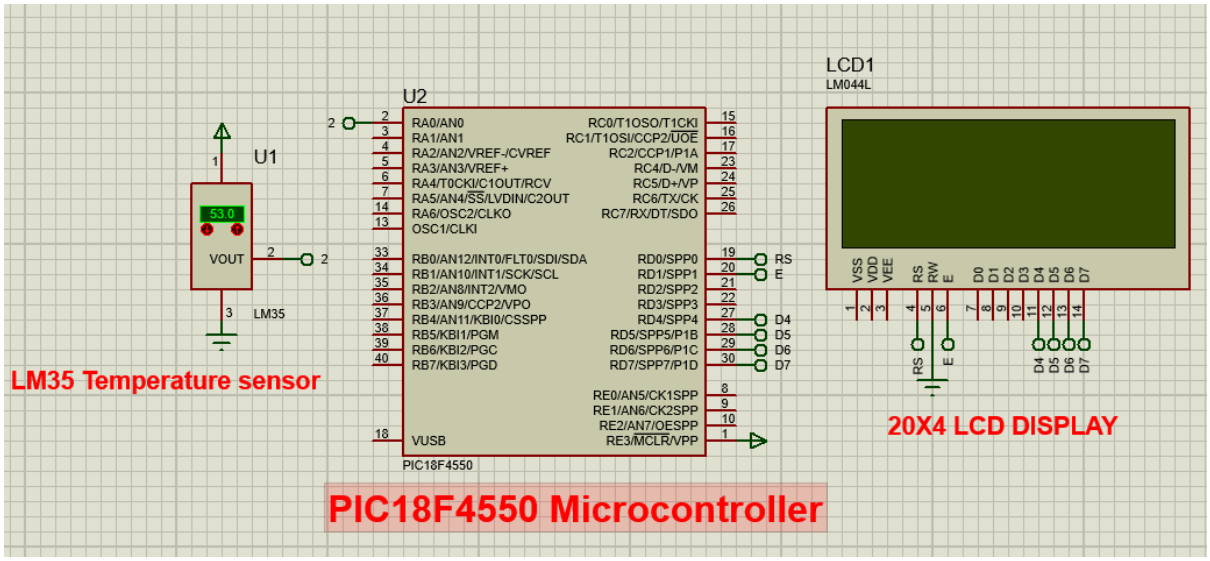
- Operating Voltage Range: 4.2V to 5.5V
- Maximum CPU Speed: 12 MIPS
- Flash Program Memory: Up to 32 KB
- RAM: Up to 2048 bytes
- Maximum I/O Pins: 36
- USB Module Current Consumption: 14 mA (typical)

❖ **20x4 LCD Screen**:

Some features from datasheet

- Operating Voltage: 5V
- Operating Temperature Range: -20°C to +70°C
- Power Consumption: 1.6 mA (typical)
- Duty Cycle: 1/16
- Backlight Current: 50 mA

Circuit diagram using proteus software



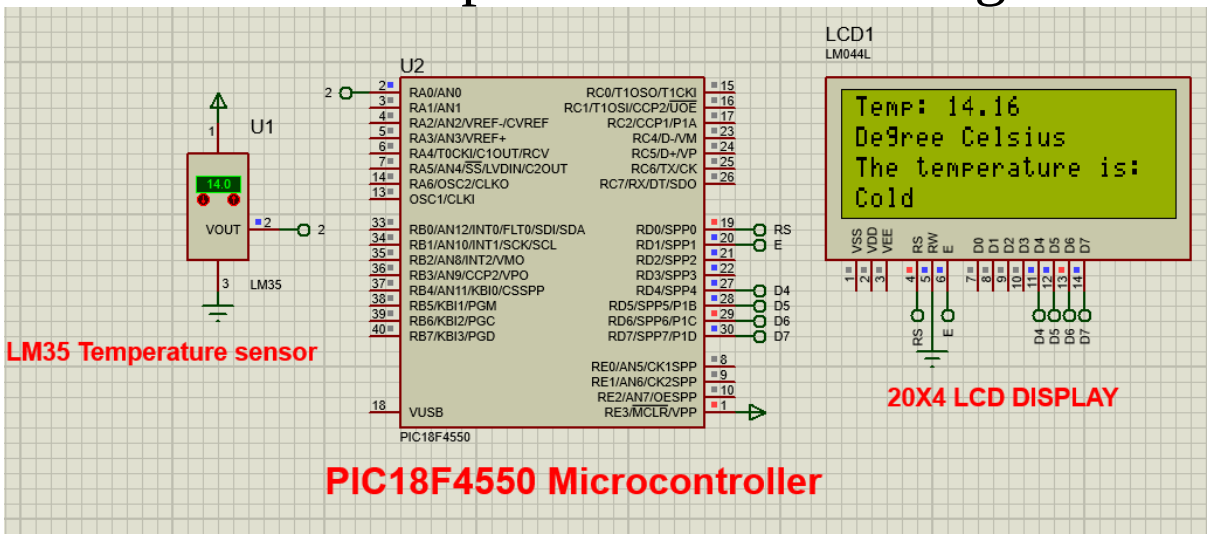
Code for the pic18F4550 using MPLAB X IDE for pic compiler

```
/*
 * File:   Source File.c
 * Project Name: LM35_PIC18_20X4 LCD
 */
```

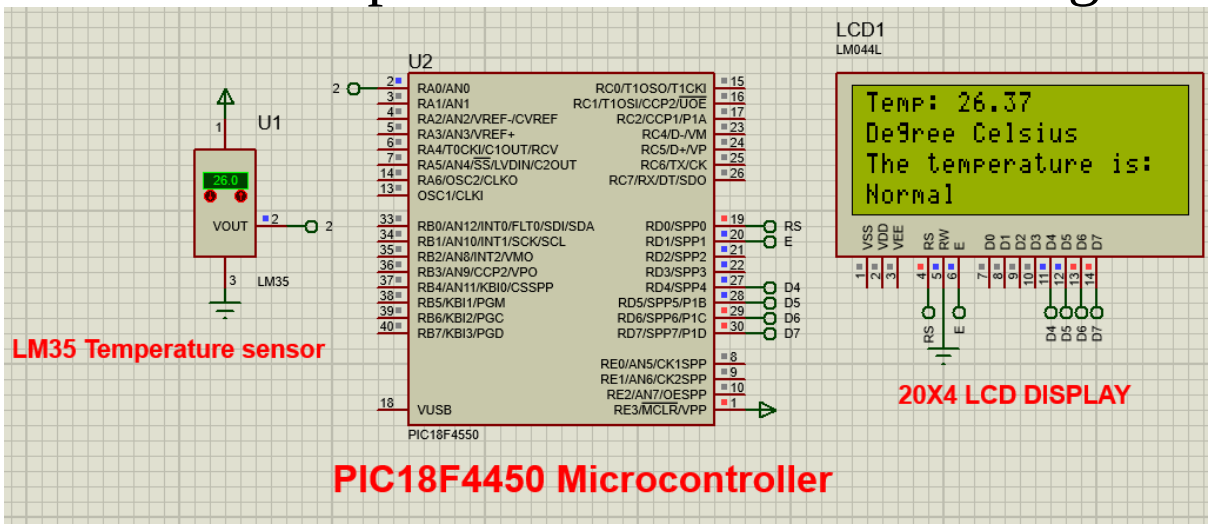
- Located in the zip folder

Simulation result

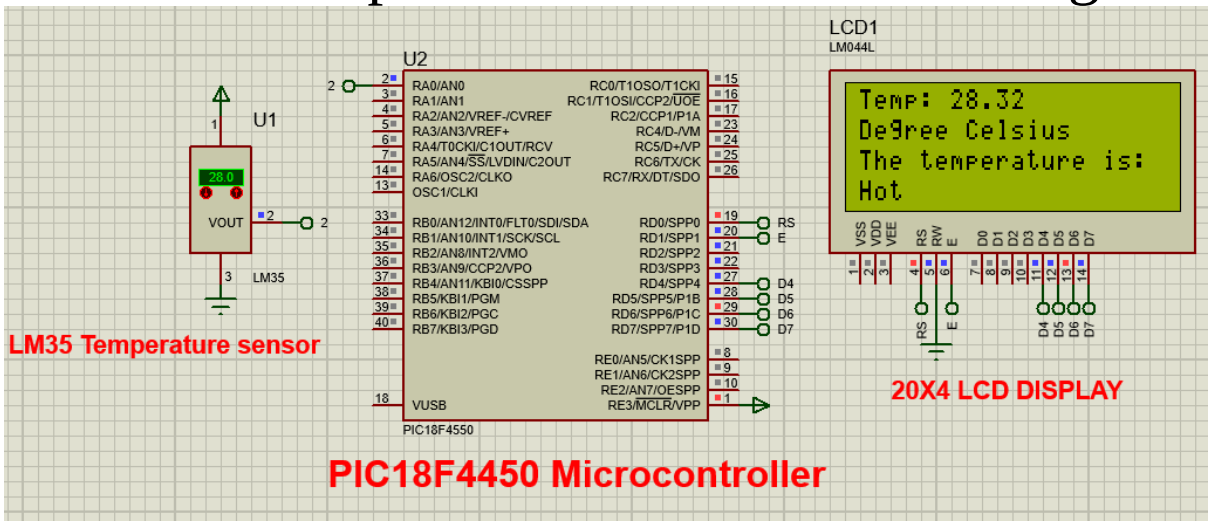
When the temperature is <= 15 degrees



When the temperature is 15 < T <= 27 degrees



When the temperature is 27 < T <= 30 degrees



When the temperature is > 30 degrees