INTRODUCTION

A digital thermometer is used to verify a smart temperature transmitter under flowing conditions and a successful calibration of the smart temperature transmitter. Portable electronic thermometers (PETs) are designed to measure temperature in a RTD-type thermowell using a thermistor or RTD probe. A thermometer has two important elements: a temperature sensor in which some change occurs with a change in temperature; and some means of converting this change into a numerical value they can be used to take temperature readings in the mouth, rectum, or armpit. When assessing digital thermometer readings, keep in mind that armpit (axillary) temperature runs about ½ to 1°F (0.6°C) cooler than oral readings.

Modules And Main Components

Atmega328

The ATmega328 is a single-chip microcontroller created by Atmel in the megaAVR family (later Microchip Technology acquired Atmel in 2016). It has a modified Harvard architecture 8-bit RISC processor core.

The Atmel 8-bit AVR RISC-based microcontroller combines 32 KB ISP flash memory with read-while-write capabilities, 1 KB EEPROM, 2 KB SRAM, 23 general-purpose I/O lines, 32 general-purpose working registers, 3 flexible timer/counters with compare

modes, internal and external interrupts, serial programmable USART, a byte-oriented 2-wire serial interface, SPI serial port, 6-channel 10-bit A/D converter (8 channels in TQFP and QFN/MLF packages), programmable watchdog timer with internal oscillator, and 5 software-selectable power-saving modes. The device operates between 1.8 and 5.5 volts. The device achieves throughput approaching 1 MIPS/MHz.

Temperature Sensor (LM35)
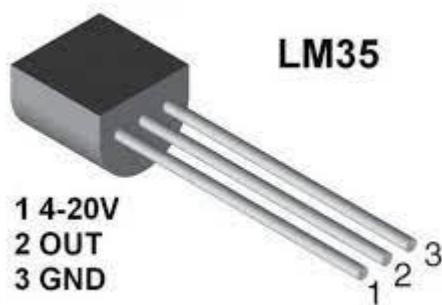
LM35 is an integrated analog temperature sensor whose electrical output is proportional to Degree Centigrade. LM35 Sensor does not require any external calibration or trimming to provide typical accuracies. The LM35's low output impedance, linear output, and precise inherent calibration make interfacing to readout or control circuitry especially easy.

Features:

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
Non-Linearity Only ±¼°C Typical
Low-Impedance Output, 0.1 Ω for 1-mA Load

LCD Display (2*16)

An LCD (Liquid Crystal Display) screen is an electronic display module and has a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. The 16 x 2 intelligent alphanumeric dot matrix display is capable of displaying 224 different characters and symbols. This LCD has two registers, namely, Command and Data.

Command register stores various commands given to the display. Data register stores data to be displayed. The process of controlling the display involves putting the data that form the image of what you want to display into the data registers, then putting instructions in the instruction register. In your arduino project Liquid Crystal Library simplifies this for you so you don't need to know the low-level instructions. Contrast of the display can be adjusted by adjusting the potentiometer to be connected across VEE pin.

ARDUINO

The **Arduino Uno** is an open-source microcontroller board based on the Microchip ATmega328P microcontroller and developed by The board is equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards (shields) and other circuits. The board has 14 digital I/O pins (six capable of PWM output), 6 analog I/O pins, and is programmable with the Arduino IDE (Integrated Development Environment), via a type B USB cable. It can be powered by the USB cable or by an external 9-volt battery, though it accepts voltages between 7 and 20 volts. It is similar to the Arduino Nano and Leonardo. The hardware reference design is distributed under a Creative Commons Attribution Share-Alike 2.5 license and is available on the Arduino website. Layout and production files for some versions of the hardware are also available.

SCHEMATIC DIAGRAM
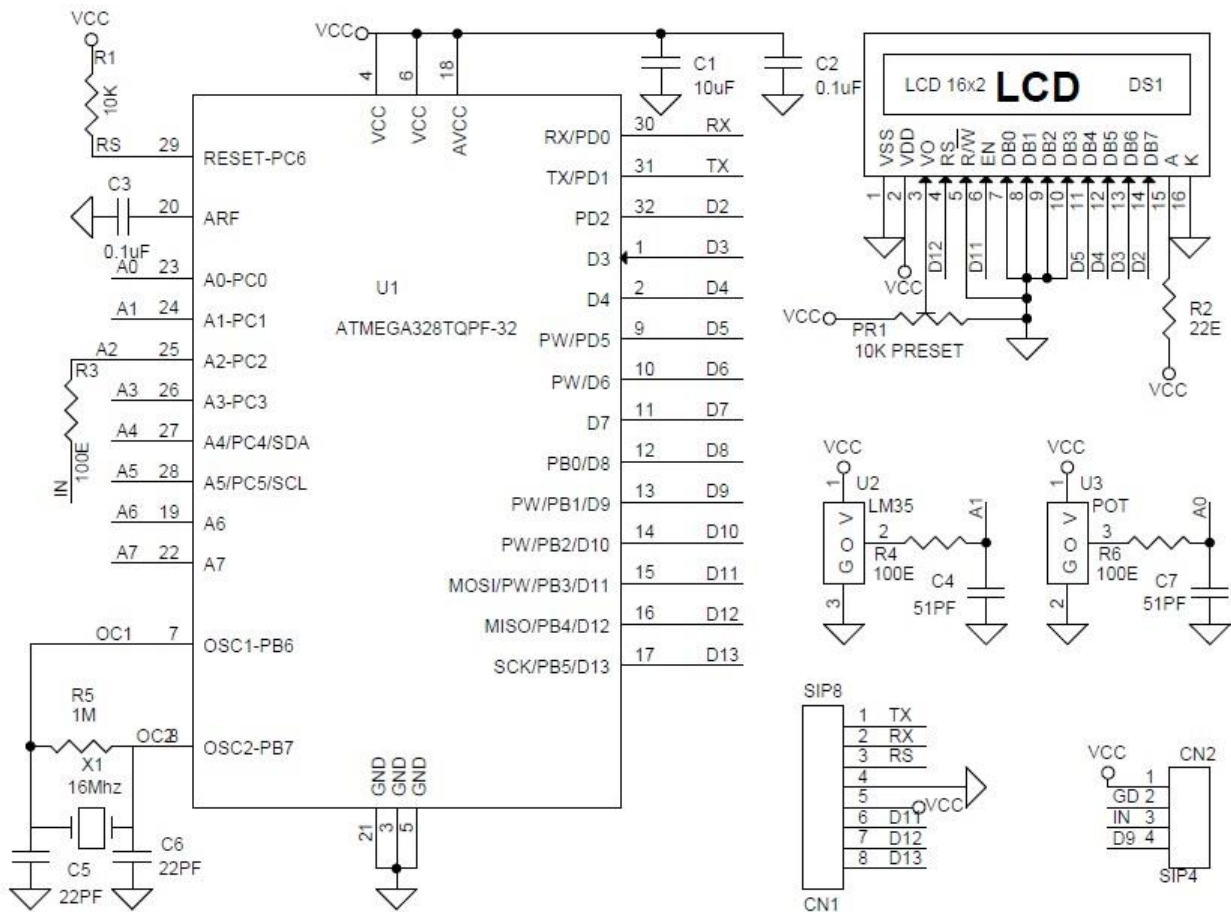
Application:

Medical Applications

Marine Applications

Industrial Applications

Advantages:

Accuracy: The temperature reading doesn't depend on scale reading and instead shown directly on the display. Hence temperature can be read exactly and accurately.

Speed: Digital thermometers can reach a final temperature in 5 to 10 seconds compared to conventional thermometers.

Safety: Digital thermometers don't use mercury, hence the hazards of the mercury is eliminated in case the thermometer breaks.

Strong: The thermometer doesn't need to be shaken for the proper mercury level, hence the risk of the tube getting broken is eliminated.

Block Diagram: