To develop a temperature monitoring system, you will need to gather the necessary components. Here is a list of the essential components required are

REQUIRED COMPONENTS :

1. MICROCONTROLLER :

- Arduino Uno or ESP8266/ESP32 : These microcontrollers will serve as the brain of the system.

2. TEMPERATURE SENSOR :

- DHT22 : A digital temperature and humidity sensor.

- LM35 : An analog temperature sensor.

- DS18B20 : A digital temperature sensor.

3. DISPLAY MODULE :

- LCD Display (16x2) : To show temperature readings.

- OLED Display : A compact and efficient display module.

4. POWER SUPPLY :

- USB Cable : For powering the microcontroller.

- Battery Pack : For portable applications.

5. CONNECTIVITY MODULE :

- Wi-Fi Module (ESP8266/ESP32) : For sending data to a cloud server.

- Bluetooth Module (HC-05) : For local wireless communication.

6. BREADBOARD AND JUMPER WIRES :

- Breadboard : For prototyping the circuit.

- Jumper Wires : For connecting components on the breadboard.

7. RESISTORS AND CAPACITORS :

- Resistors : To limit current and protect components.

- Capacitors : For filtering and stabilizing voltage.

8. SOFTWARE :

- Arduino IDE : For programming the microcontroller.

- Blynk App or ThingSpeak : For visualizing data on a mobile device or web browser.

BROWSING FUNTIONALITIES OF THE COMPONENTS :

MICROCONTROLLER

1. Arduino Uno :

- Functionality : A microcontroller board based on the ATmega328P, used for building digital devices and interactive objects.

- Features : 14 digital I/O pins, 6 analog inputs, 16 MHz quartz crystal, USB connection, power jack, ICSP header, and a reset button.

2. ESP32/ESP8266 :

- Functionality : Microcontrollers with built-in Wi-Fi and Bluetooth capabilities, ideal for IoT applications.

- Features : GPIO pins, ADC, PWM, SPI, I2C, UART, integrated Wi-Fi, and Bluetooth (ESP32).

TEMPERATURE SENSOR

3. DHT22 :

- Functionality : Measures temperature and humidity.

- Features : Operating voltage: 3.3V to 5.5V, temperature range: -40°C to 80°C, humidity range: 0-100%, accuracy: ±0.5°C.

4. LM35 :

- Functionality : Analog temperature sensor that outputs a voltage proportional to the temperature.

- Features : Operating voltage: 4V to 30V, temperature range: -55°C to 150°C, accuracy: ±0.5°C at 25°C.

5. DS18B20 :

- Functionality : Digital temperature sensor with 1-Wire interface.

- Features : Operating voltage: 3V to 5.5V, temperature range: -55°C to 125°C, accuracy: ±0.5°C.

DISPLAY MODULE :

6 LCD Display (16x2) :

- Functionality : Display module to show temperature readings.

- Features : 16 characters by 2 lines, operating voltage: 5V, compatible with Arduino.

7. OLED DISPLAY :

- Functionality : Compact display module for showing temperature readings.

- Features : High contrast, low power consumption, various sizes (0.96", 1.3"), operating voltage: 3.3V to 5V.

CONNECTIVITY MODULE

8. Wi-Fi Module (ESP8266/ESP32):

- Functionality : Provides Wi-Fi connectivity to send data to a cloud server.

- Features : Integrated TCP/IP protocol stack, GPIO pins, supports 802.11 b/g/n.

9. BLUETOOTH MODULE (HC-05) :

- Functionality : Enables local wireless communication.

- Features : Bluetooth V2.0+EDR, 3Mbps modulation, UART interface, operating voltage: 3.3V to 5V.

SOFTWARE

10. ARDINO IDE :

- Functionality : Development environment for writing and uploading code to Arduino boards.

- Features : Supports multiple programming languages, code editor, serial monitor, and library manager.

By gathering these components and understanding their functionalities, you can start building a temperature monitoring system. Use the Arduino IDE to program the microcontroller, and employ display modules to visualize data locally, while connectivity modules can be used for remote data monitoring and control.