Experiment No: 06

Experiment Title: Liquid Crystal Displays (LCD) with Arduino

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Experiment 06: Liquid Crystal Displays (LCD) with Arduino

<u>Objectives:</u>

The main objectives of this experiment are:
- To create a simple IoT application that displays real-time data on an LCD screen using Arduino and various sensors.
- To connect sensors to the Arduino, reading data from these sensors, and displaying the information on the LCD.
- To connect the potentiometer for optimal contrast on the LCD.

<u>Materials:</u>

- Arduino Uno Board
- USB Cable
- Breadboard
- Jumper Wires
- Liquid Crystal Display (LCD) Screen
- Potentiometer
- LM35 Temperature Sensor
- Laptop

<u>Introduction:</u>

The Internet of Things (IoT) is a rapidly evolving field that involves connecting physical devices to the internet to gather and exchange data. Liquid Crystal Displays (LCDs) are commonly used output devices that can be integrated into IoT projects for displaying real-time information. In this experiment, we explore the combination of LCDs with Arduino to build a basic IoT application.

<u>Procedures:</u>

Experimental Setup:
- Connect the Temperature Sensor (LM35) to Arduino using appropriate pins.
- Connect the LCD to the Arduino using appropriate pins.
- Connect the Potentiometer (for LCD contrast control)
- Ensure all connections are secure on the breadboard.
- Connect the Arduino board to a power source using either USB or an external power supply.

Source Code:

We used the following code -

```cpp
#include <LiquidCrystal.h>
int sensorpin=A0;
int temperature=0;
LiquidCrystal lcd(12, 11, 5, 4, 3, 2);


void setup() {
 pinMode(sensorpin, INPUT);
 lcd.begin(16, 2);
 lcd.print("Temperature: ");


}


void loop() {
 temperature=analogRead(sensorpin);
 temperature=temperature*0.48828125;


 lcd.setCursor(0,1);
 lcd.print(temperature);
 lcd.print((char)223);
 lcd.print("C");
}
```

- Click on the "Upload" button to transfer the code to the Arduino board.
- Power up the Arduino board by connecting it to the computer.
- Observe the temperature on the LCD Screen.

Results and Discussions:

Upon successful completion of the setup and code upload, the LCD should display the "Temperature: " message on the first line and the real-time temperature reading with the degree Celsius symbol on the second line. The temperature reading should update continuously as the sensor data changes.
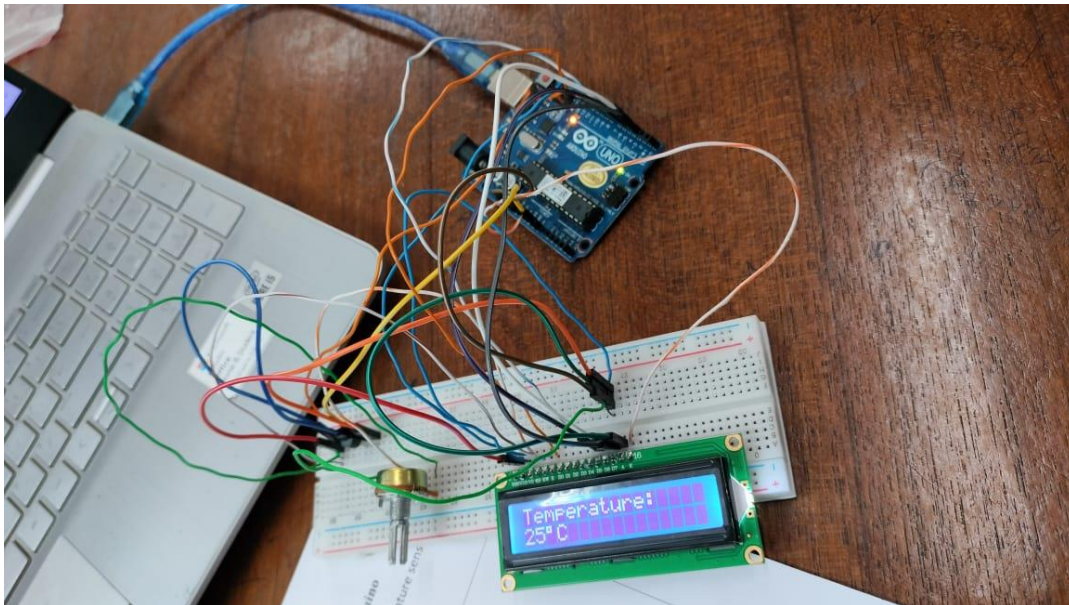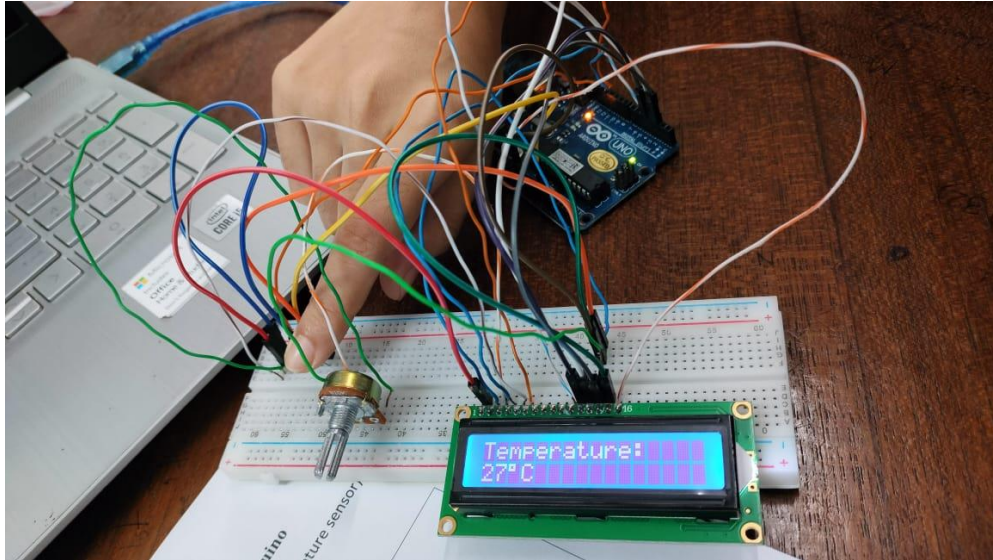
Adjust the potentiometer for optimal contrast on the LCD. If the displayed text is not clear, tweak the potentiometer until the text is legible.

Conclusion:

The integration of a temperature sensor with Arduino and its visualization through a Liquid Crystal Display (LCD) has been successfully demonstrated in this experiment. The objectives, including sensor integration, calibration, LCD interfacing, and continuous monitoring, were achieved.

The experiment provided valuable insights into the practical aspects of sensor interfacing, analog-to-digital conversion, and real-time data display using Arduino. The LCD served as an effective output interface, displaying the temperature readings with clarity and user-friendliness.