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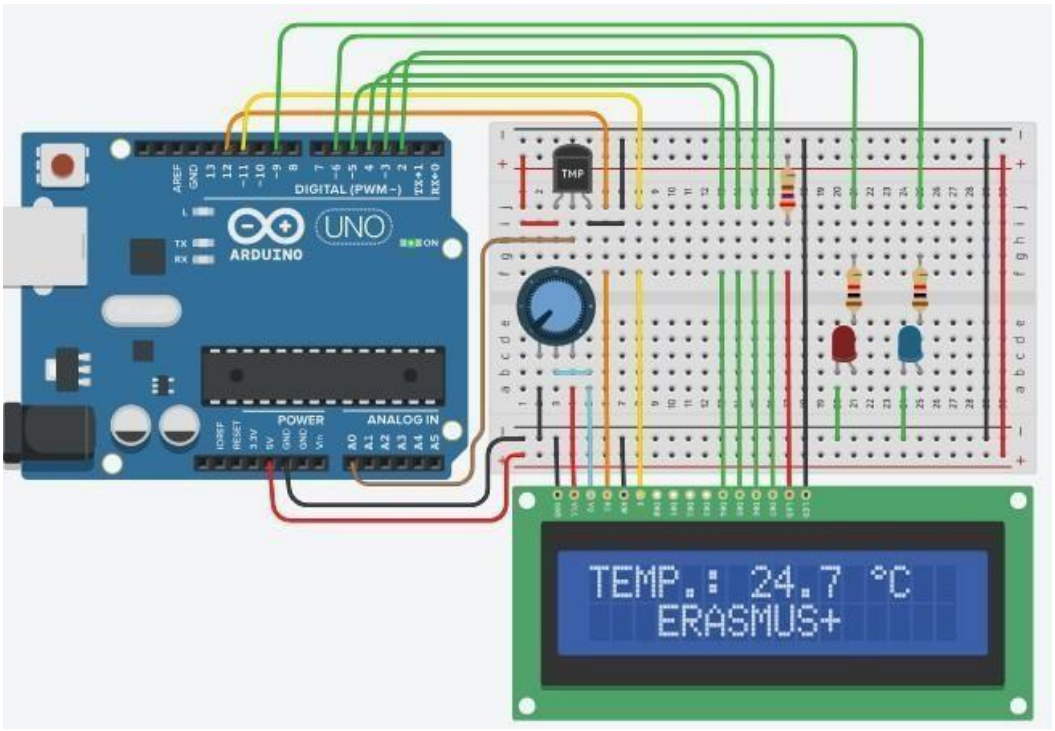
Heating/Cooling Project Tinkercad

Creation of a Temperature Control Simulator using Arduino with Tinkercad

- **Project Title:** Discover the Green Life with Robots.
- **Project ID:** 2023-1-HU01-KA210-VET-000156243.

I. Circuit Implementation and Components



This circuit implements a temperature control circuit using **Arduino UNO**. The circuit was wired and programmed using the **Tinkercad simulator**.

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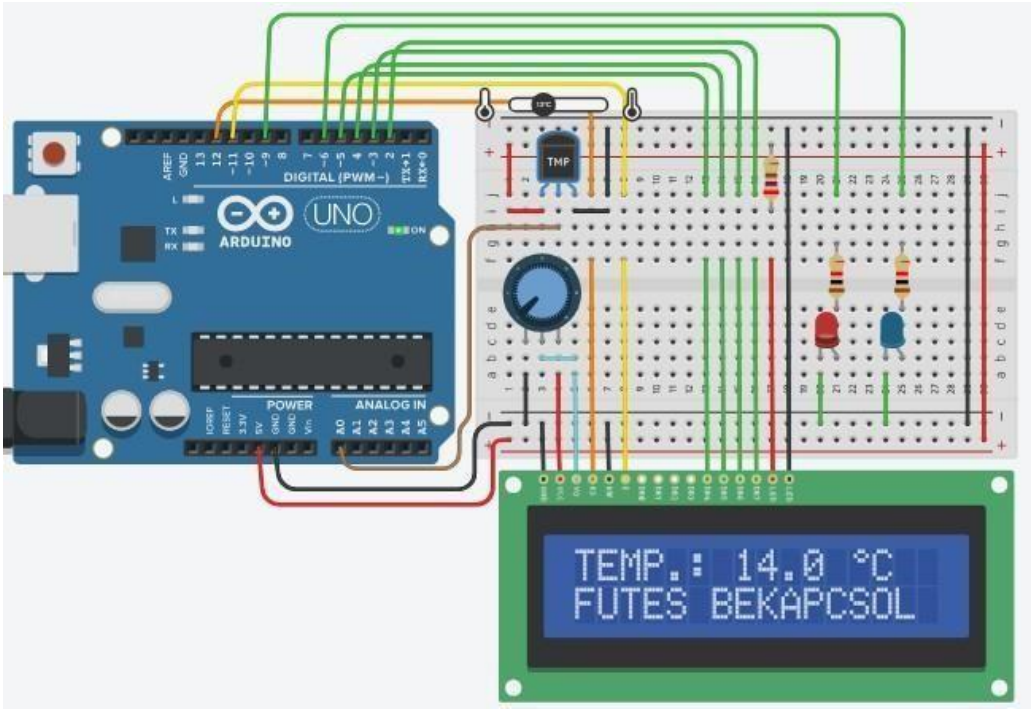

- **Indicators:** Cooling is indicated by a **blue LED**. Heating is indicated by a **red LED**.
- **Sensor:** Temperature sensing is performed by the **TMP36 sensor**.
- **Display:** The readable appearance of the display can be adjusted with a **potentiometer**.
- **Control Logic:**
    - Heating is switched ON when the temperature falls **below 18 degrees Celsius**.
    - Cooling is switched ON **above 28 degrees Celsius**.

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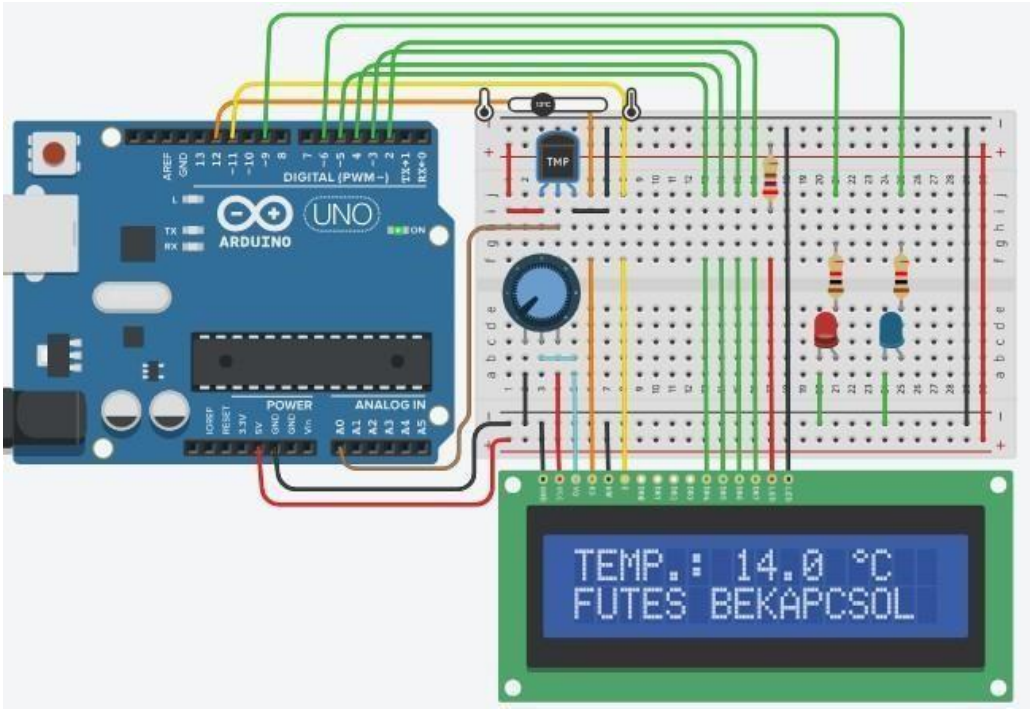

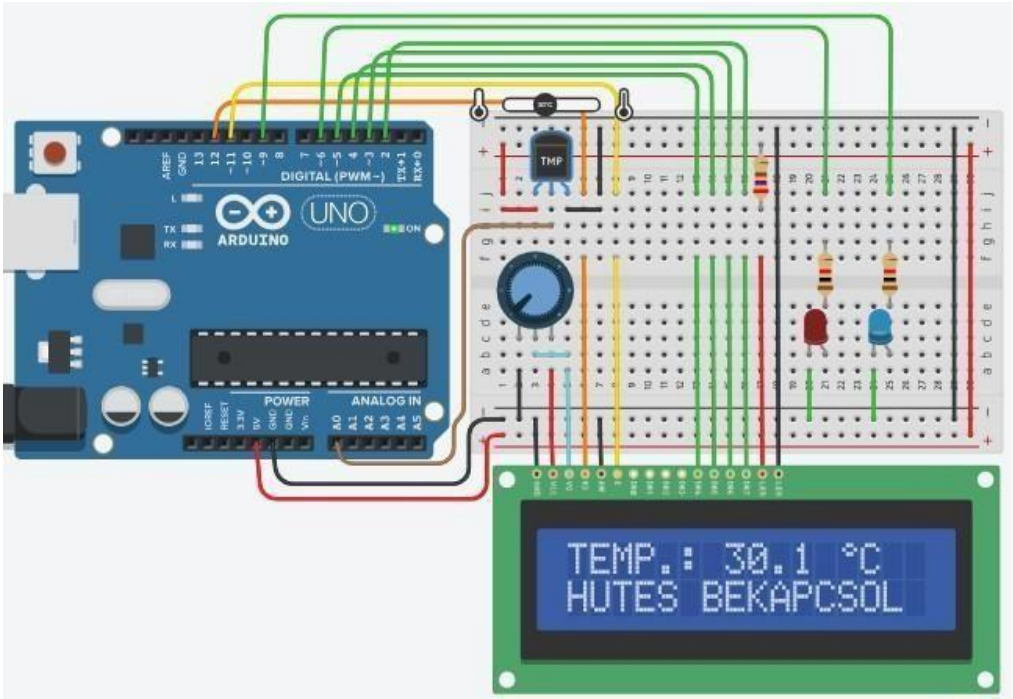

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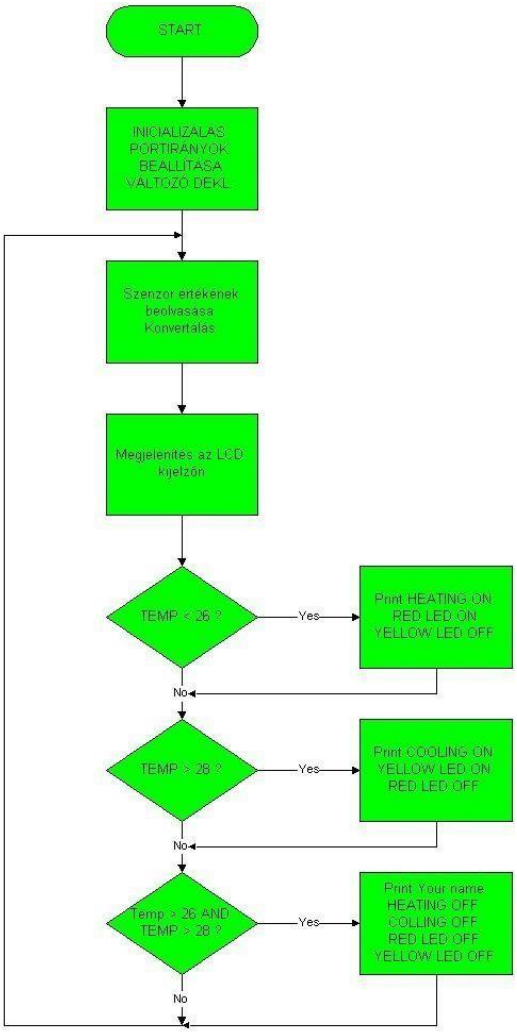

II. Source Code (Arduino C++)

The source code was written based on the flowchart for the Erasmus+ project.

- **Author:** Kiss Antal István.
- **Project Description:** Heating-Cooling Project.
- **Libraries:** Includes <LiquidCrystal.h>.

```
#include <LiquidCrystal.h>

// LCD pins: RS(12), Enable(11), D4(5), D5(4), D6(3), D7(2)

LiquidCrystal lcd(12,11,5,4,3,2);

// Pin Definitions

int TMP36 = A0; // Temperature sensor connected to Analog pin A0
```

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```
int hut = 9;    // 'Cooling' output connected to Digital pin 9
int fut = 6;    // 'Heating' output connected to Digital pin 6


// Custom character array definition for the degree symbol (°)
byte fok[]=
{
   B00110,
   B01001,
   B00110,
   B00000,
   B00000,
   B00000,
   B00000,
   B00000,
};


void setup()
{
   // Set 'Cooling' and 'Heating' pins as output
   pinMode(hut, OUTPUT);
   pinMode(fut, OUTPUT);


   // Initialize the LCD (16 columns, 2 rows)
   lcd.begin(16, 2);
   lcd.print("TEMP.:");
```

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```
  // Create custom character for the degree symbol at index 0
  lcd.createChar(0,fok);
}

void loop()
{
  // Read Analog input A0
  int reading = analogRead(TMP36);
  // Convert reading to voltage
  float volt = reading * (5.0 / 1024.0);
  // Convert voltage to Celsius temperature
  float Temp = (volt-0.5) * 100;

  // Display Temperature value
  lcd.setCursor(7,0);
  lcd.print(Temp,1);       // Write Temp variable value
  lcd.print(" ");            // Space
  lcd.write(byte(0));      // Write the custom degree symbol
  lcd.print("C");
  lcd.setCursor(0,1);      // Set cursor to the 1st character of the 2nd row

  // Control Logic
  if (Temp < 18){
    lcd.print ("HEATING ON     "); // Translation: FUTES BEKAPCSOL
    digitalWrite(fut, HIGH); // Turn Heating LED/Actuator ON
  }
```

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```
  else if (Temp > 28)
  {
    lcd.print ("COOLING ON     "); // Translation: HUTES BEKAPCSOL
    digitalWrite(hut, HIGH); // Turn Cooling LED/Actuator ON
  }

  // Print project label (This print statement may overwrite the previous status messages)
  lcd.print ("   ERASMUS+    ");

  // Switch Off Actuators (Note: these lines turn outputs LOW immediately after control check)
  digitalWrite(fut, LOW);
  digitalWrite(hut, LOW);

}
```