Lab 2. Love Machine

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1. Introduction

- **Brief description of the experiment:**

  This project aims to demonstrate how a temperature sensor can be used to control three LEDs, each lighting up depending on the measured temperature. At lower temperatures, no LED is lit, and as the temperature increases, all three LEDs light up gradually.

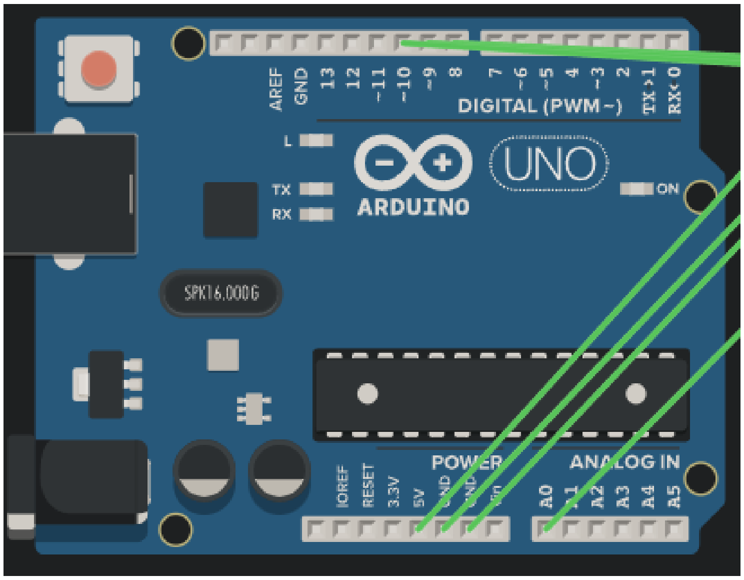
- **Experiment objectives:**
  - To understand how a temperature sensor works.
  - To implement a method of controlling LEDs based on sensor readings.
  - To become familiar with using Arduino for reading sensors and controlling electronic components.

2. Required Components

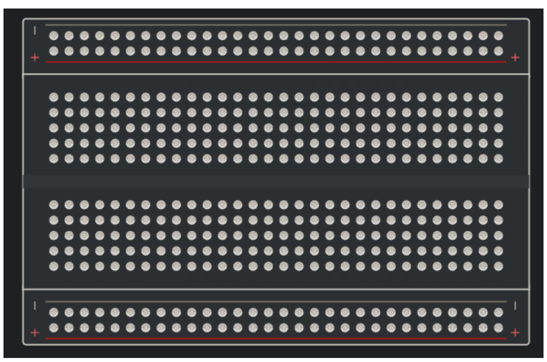
- **Arduino Uno R3**
- **Electronic components used:**
  - **Breadboard**: Used for connecting the circuit.
  - **Resistors**: 3 resistors of 220 ohms to limit the current through the LEDs.
  - **LEDs**: 3 LEDs of different or similar colors to indicate various temperature levels.
- **Senzors:**
  - **TMP36 Temperature Sensor**: Used to measure ambient temperature.

Component Descriptions:

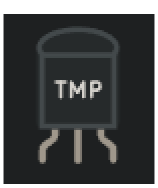
- **Arduino Uno R3**: A development board based on the ATmega328P microcontroller, ideal for prototyping and programming.



- **Breadboard**: A useful device for making temporary connections between electronic components without soldering.

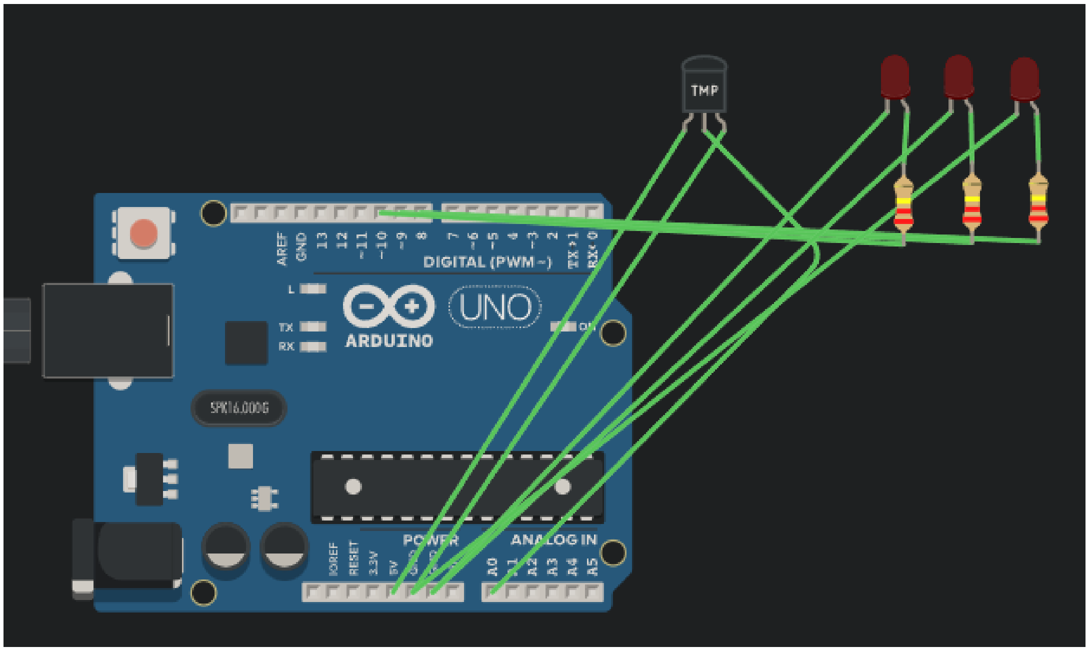


- **Resistors**: Passive devices that limit electric current, protecting electronic components.
- **LEDs**: Semiconductor devices that emit light when forward biased.
- **TMP36**: A precision temperature sensor that provides an analog voltage proportional to temperature.



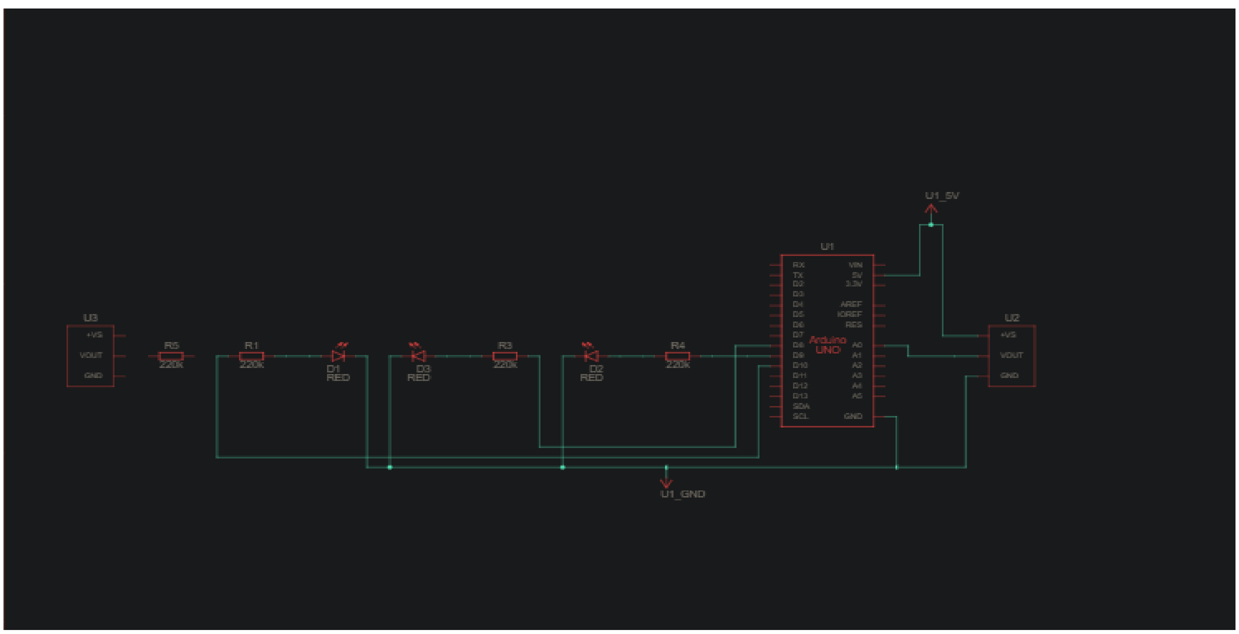
3. Circuit Diagram

- **Description:** The diagram will show how the components are connected to each other, specifying each connection between Arduino, LEDs, resistors, and the temperature sensor.



4. Wiring Schematic

- **Description:**The detailed electrical schematic of the circuit, including the electrical connections between all mentioned components.



5. Working Procedure

- **Step-by-step description of the necessary operations to carry out the experiment:**
  1. Connect the resistors to each LED and connect them to digital pins 8, 9, and 10 on the Arduino board.
  2. Connect the GND pin of each LED to GND on the Arduino.
  3. Connect the TMP36 sensor: pin 1 to 5V, pin 2 to A0, and pin 3 to GND.
  4. Make the connections on the breadboard according to the diagram.
  5. Write and upload the code to Arduino using the Arduino IDE.
  6. Test the circuit's functionality and adjust the code if needed.

6. Programming

- **Software used:** Arduino IDE

Code:

```
const int sensorPin = A0; // TMP36 este conectat la A0
const int led1 = 8;       // LED 1 conectat la pinul digital 8
const int led2 = 9;       // LED 2 conectat la pinul digital 9
const int led3 = 10;      // LED 3 conectat la pinul digital 10

void setup()
{
  pinMode(led1, OUTPUT);
  pinMode(led2, OUTPUT);
  pinMode(led3, OUTPUT);
  Serial.begin(9600); // Începem comunicarea serială pentru depanare
}

void loop()
{
  int sensorValue = analogRead(sensorPin);
  float voltage = sensorValue * (5.0 / 1023.0);
  float temperatureC = (voltage - 0.5) * 100.0;

  Serial.print("Temperatura: ");
  Serial.print(temperatureC);
  Serial.println(" C");

  if (temperatureC >= 25)
```

```
  {
    digitalWrite(led3, HIGH); // Aprindem toate LED-urile
    digitalWrite(led2, HIGH);
    digitalWrite(led1, HIGH);
  }
  else if (temperatureC >= 20)
  {
    digitalWrite(led3, LOW); // Aprindem 2 LED-uri
    digitalWrite(led2, HIGH);
    digitalWrite(led1, HIGH);
  }
  else if (temperatureC >= 15)
  {
    digitalWrite(led3, LOW); // Aprindem 1 LED
    digitalWrite(led2, LOW);
    digitalWrite(led1, HIGH);
  }
  else
  {
    digitalWrite(led3, LOW); // Stingem toate LED-urile
    digitalWrite(led2, LOW);
    digitalWrite(led1, LOW);
  }

  delay(1000); // Așteptăm o secundă înainte de a citi din nou temperatura
}
```

7. Conclusions

This experiment demonstrated how a temperature sensor can be used to control various electronic devices such as LEDs. We successfully implemented a simple temperature monitoring system that lights up LEDs based on measured values.