Temperature Controlled DC Fan using Arduino

ABSTRACT

A DC fan control system based on high temperatures is designed and simulated in this project. This method combines an Arduino with a DHT11 temperature and humidity sensor. By turning on the fan, the room's temperature will be lowered. The DHT11 Sensor will be used to superintend the fan. The temperature will be continuously monitored by the sensor. When the temperature exceeds a predetermined level, the fan will be operating in "On" mode. The room's current temperature will be displayed on the LCD screen.

INTRODUCTION

Scalable systems are constantly being developed as a result of technology advancement. Everything is getting easier to access and more convoluted. More consumers are preferring modern technology and sophisticated electronic components. Arduino plays a major role in the development of smart systems as the brain of the system.

It should be noted that Arduino cannot deliver the current necessary for a DC motor to function, hence the DC motor is really not directly linked to the Arduino. In many fields of life nowadays, Arduinos are employed to perform automated activities more precisely.

The electric fan is one of the most often used electrical appliances because of its advantages of low cost and power consumption. In order to keep the environment comfortable, there is a necessity for precise temperature regulation. Automated systems are used to further automation and the pursuit of simplicity. Primitive feeling of switching on and off a fan and adjusting the speed controller. In this manner, the only way the fan speed may be altered by the temperature is by manual adjustment. Therefore, a fan speed control system that changes automatically based on temperature measurement is required.

Utilizing the capabilities of the Arduino, the automatic temperature regulated fan offers a speed control mechanism for the fan that is independently controlled by temperature. The fan measures the ambient temperature using an Arduino, a motor, cables, sensors, and other gear, and then adjusts its speed automatically based on that information. One advantageous application is the incorporation of an Arduino in a temperature controller that can be used to autonomously change the fan's velocity in order to spontaneously control the temperature of a room.

LITERATURE REVIEW

Temperature is the environmental variable that is most frequently observed. The degree or intensity of heat contained in a material or item, particularly as expressed according to a comparative scale and exhibited by a thermometer or sensed by touch, is referred to as temperature, according to Oxford Dictionaries. Typically, temperature is expressed in either Celsius or Fahrenheit.

The typical fans in homes and businesses are controlled by a manual system. A rotary switch with an inside potentiometer is used to control it. The potentiometer modifies current flow to the fan, which modifies fan speed. There are some issues with this system that affect user comfort. As the temperature and weather conditions fluctuate throughout the day, for instance, the speed of the fan needs to be adjusted at regular intervals. Additionally, it may get cold at night or in the morning. Therefore, either the fan speed needs to be changed before going to bed or the user needs to wake up at the wrong time to manually modify it. People who are sensitive to temperature changes may find it challenging and it may make them sick, especially young children and infants. Numerous studies have examined the monitoring and regulation of temperature. Alex Newton (2019), for instance, conducted research on how to regulate temperature by fan speed using an Arduino and an LM35 temperature sensor. However, using the LM35 sensor in this system causes several problems, such as the need to repeatedly alter the source code in order to acquire the desired results. The system of fan speed control and temperature monitoring that we have put into place is powered by Arduino UNO. The fan ought to immediately turn off when the room temperature falls below 30 degrees, and turn on when the temperature reaches 30 degrees or higher. Both hardware and software programming are needed for this project. For the hardware section, you'll need to construct an Arduino-based circuit with input and output blocks. The circuit's input block is made up of a temperature and humidity sensor. The LCD and DC fan make up the circuit's output block. The current room temperature and the status of the circuit, including whether it is ON or OFF, will both be shown on the LCD.

METHODOLOGY

a. Block Diagram:

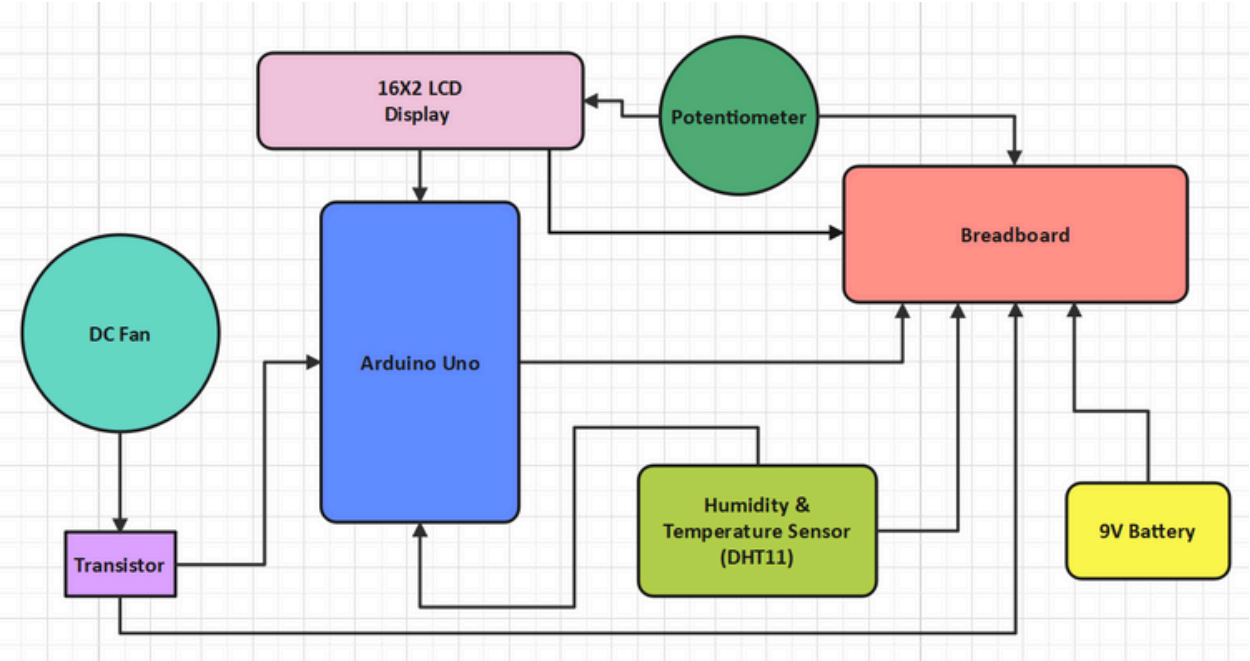

Fig.1. Block Diagram of Temperature Controlled DC Fan

This block diagram gives us an idea of the components of the respective project and also shows how the components are connected to each other.

b. Circuit Diagram:

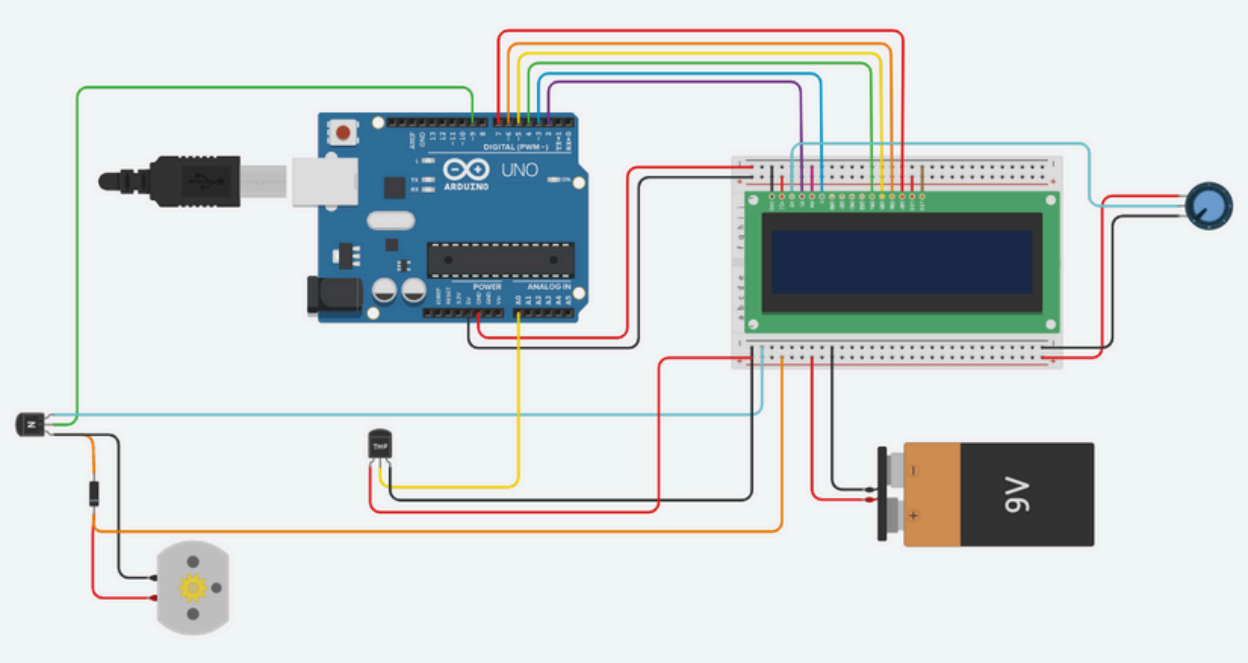

Fig.2. Circuit Diagram of Temperature Controlled DC Fan

The schematic above shows the 3D details of the hardware simulation. Here you can see what the components look like and the detailed connections between these components.

c. Flowchart:

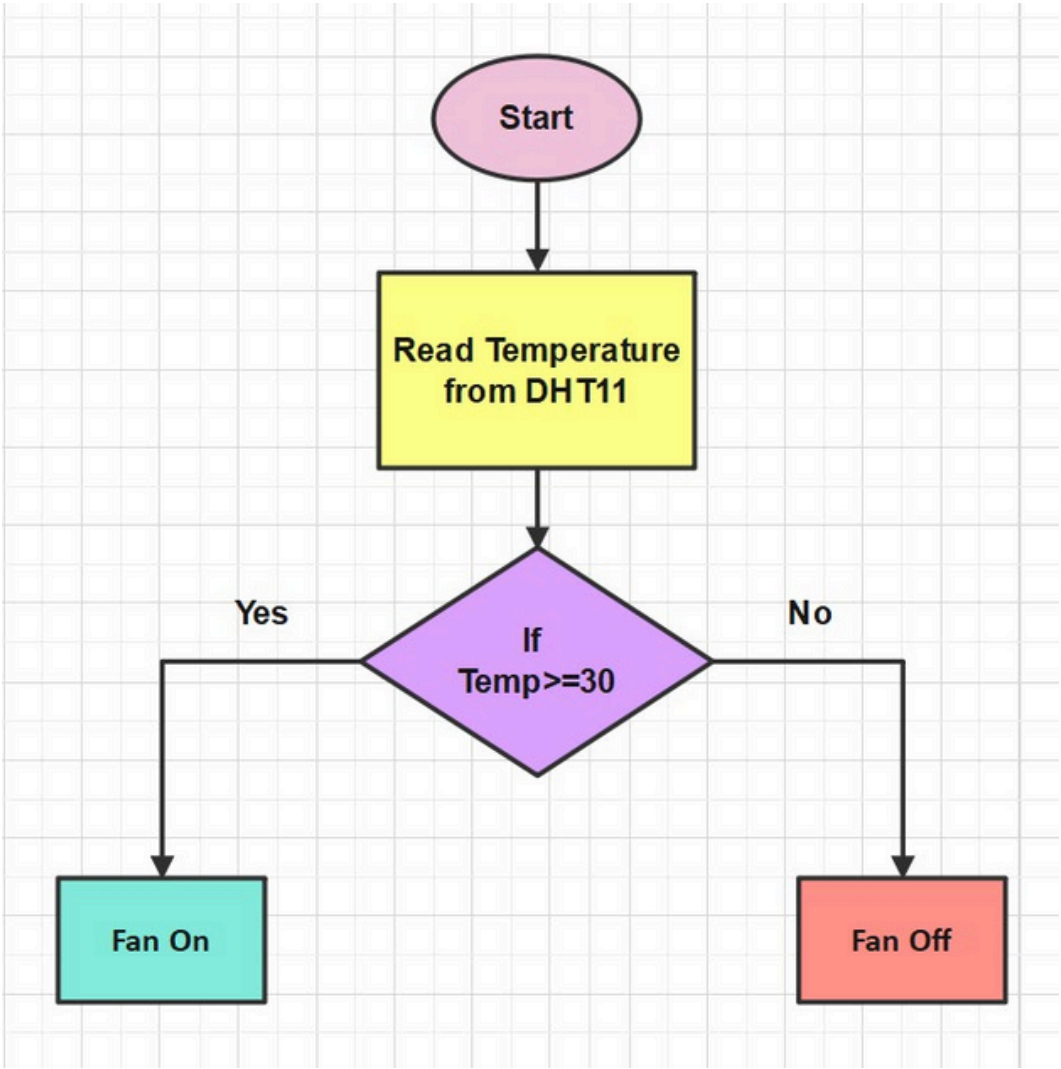

Fig. 3. Flowchart of Temperature Controlled DC Fan

The flowchart showing the workflow of the deployed project.

d. Description:

In this Arduino based project we have created a temperature controlled DC fan. With this project, we will be able to adjust the fan speed in our home or office based on the ambient temperature, and display temperature changes and fan status on a 16x2 LCD. In this project we used Arduino UNO board, LCD display, DHT11 sensor module and DC fan.

This estimation project works in several phases. The temperature is detected by the humidity and temperature sensor, namely the DHT11. After reading the DHT11 sensor module's output and converting the temperature data to the correct number in degrees Celsius, another component controls the fan. Finally, the system tells whether the fan is on or off and shows the temperature on the LCD panel.

REQUIRED INSTRUMENTS

NO.	COMPONENT NAME	QUANTITY
1.	Arduino Uno R3	1
2.	DHT11 Temperature & Humidity Sensor	1
3.	DC Fan	1
4.	LCD 16X2	1
5.	NPN Transistor	1
6.	Diode	1
7.	Potentiometer	1
8.	9V Battery	1
9.	Breadboard	1
10.	Jumper Wires	23

PICTURE OF THE IMPLEMENTED PROJECT

- Hardware Simulation:

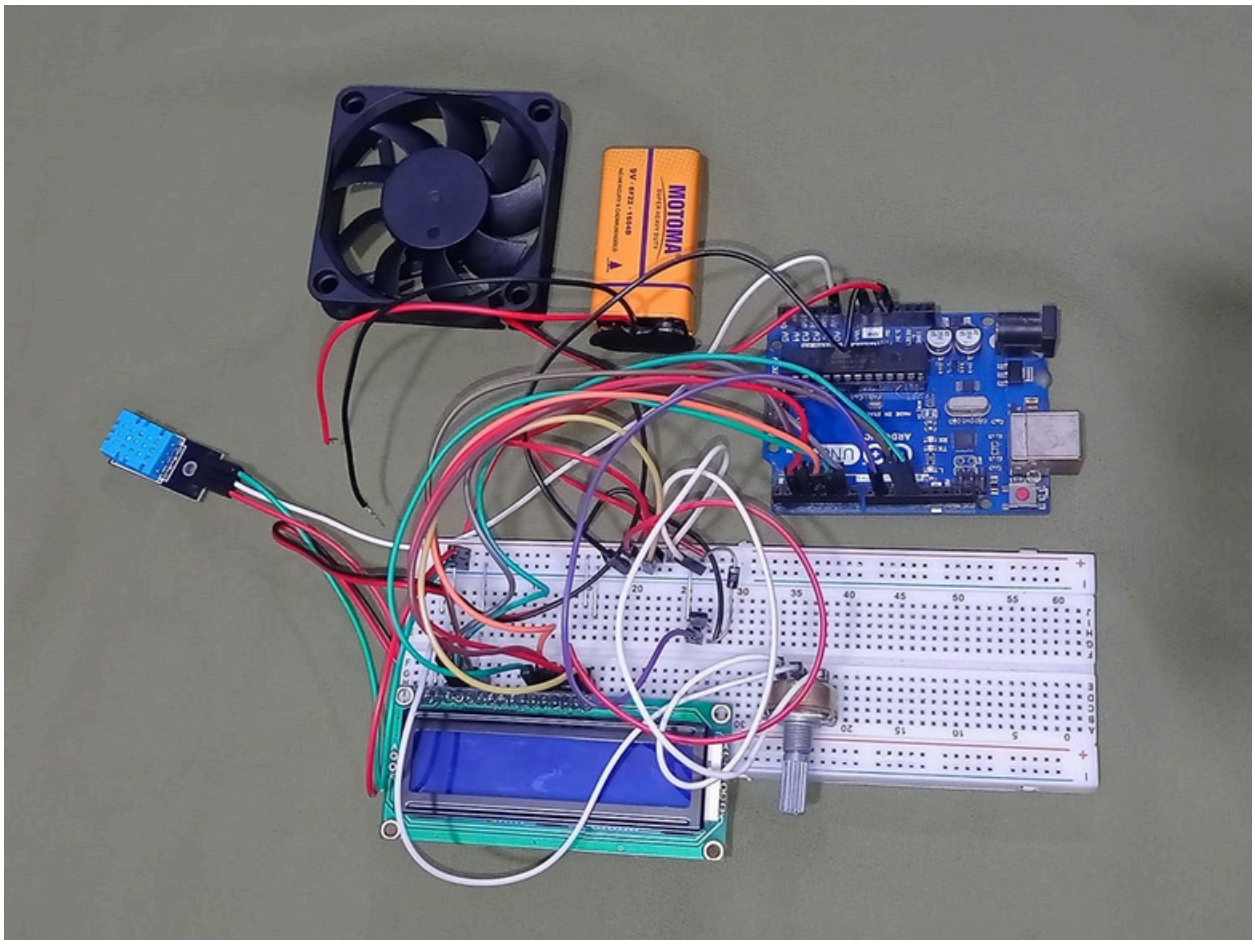

Fig. 4. Hardware without Battery Connection

- If the temperature is below 30 degrees, fan turned off.

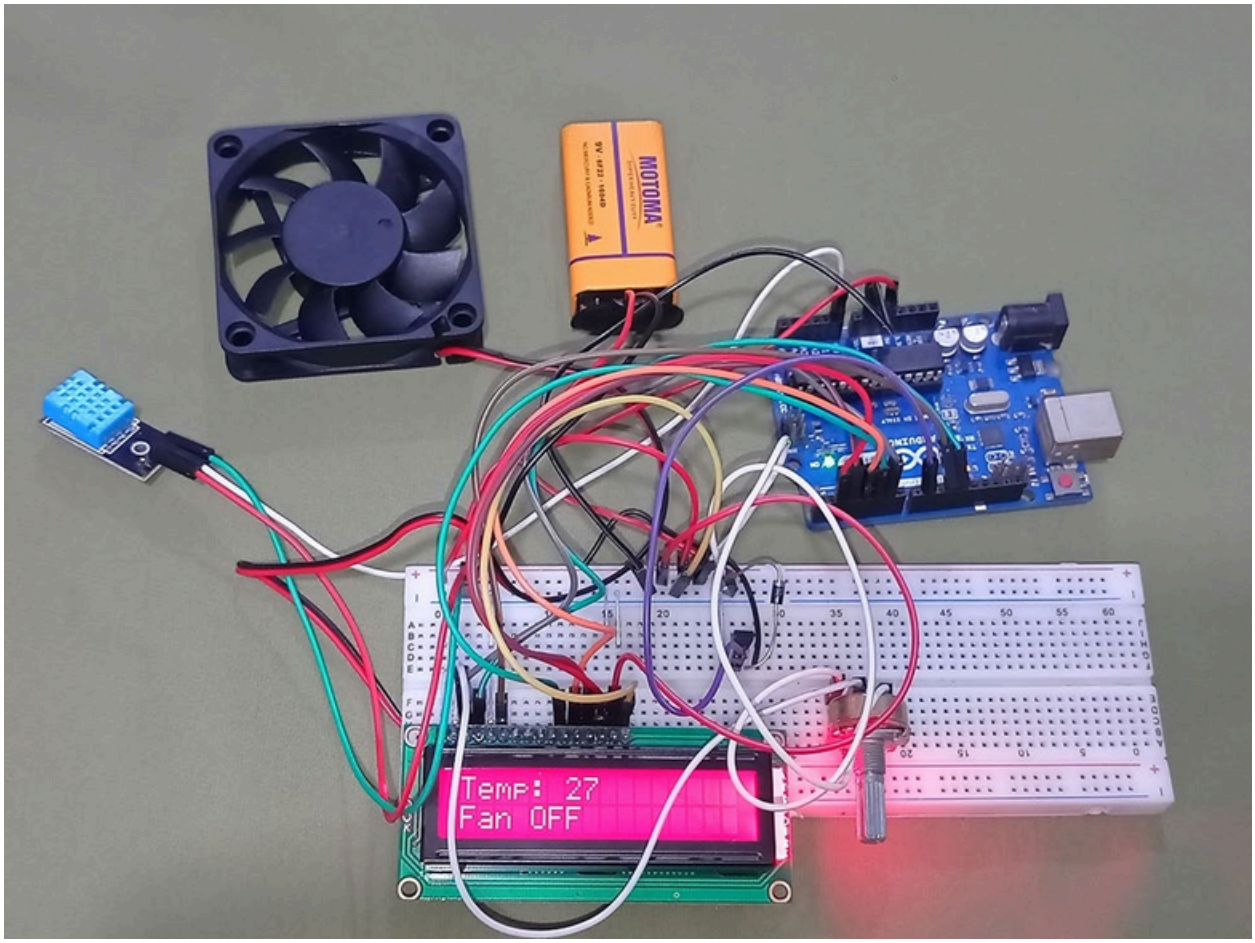

Fig. 5. Fan is OFF

- The fan turns on when the temperature is 30 or more than 30 degrees.

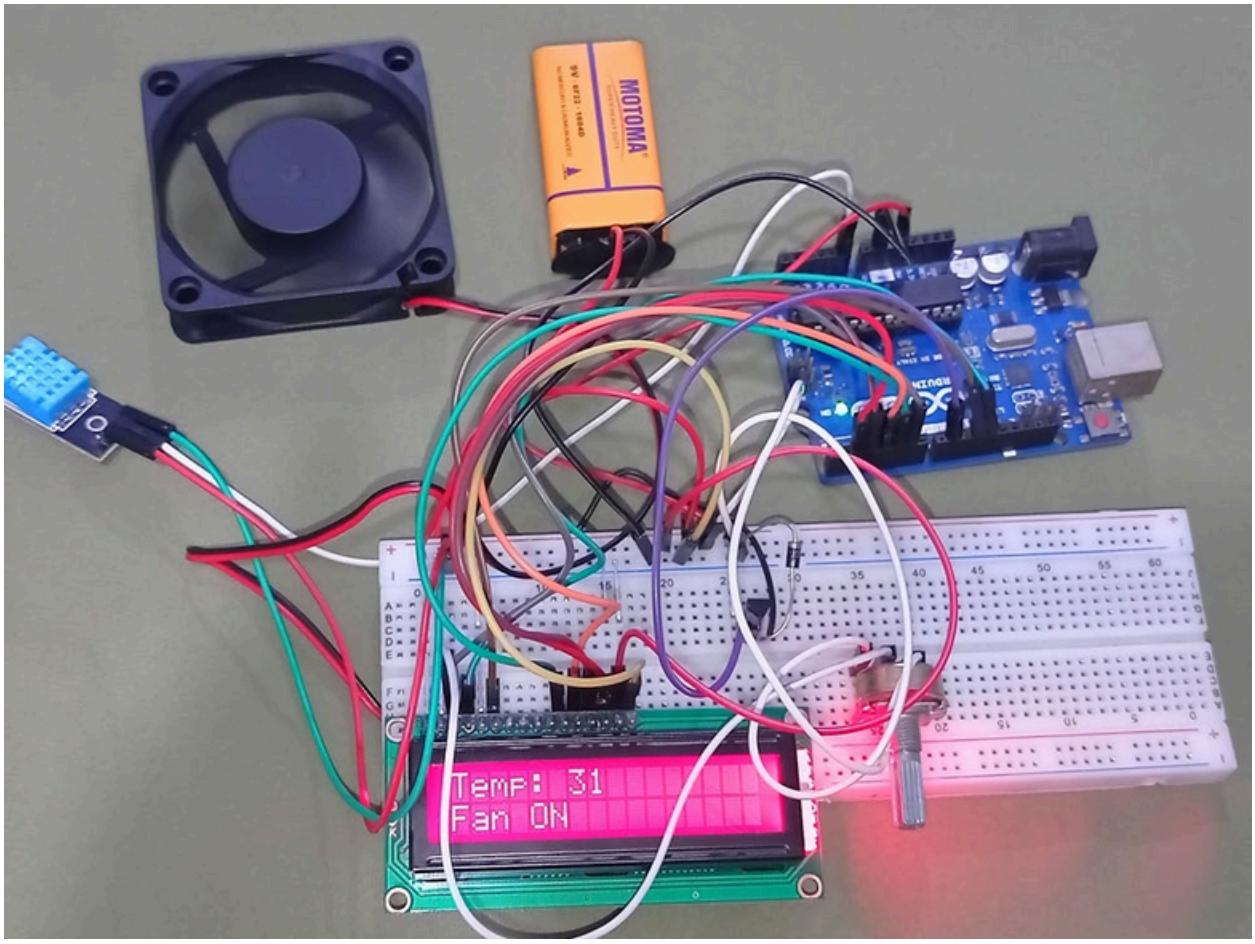

Fig. 6. Fan is ON

RESULT ANALYSIS

However, an experimental setup was completed, and numerous temperature measurements were taken and shown appropriately. Here are a few sample displays and observations along with a quick commentary.

The main outputs of this effort are two. One was to automatically display the temperature on an LCD display, and the second automatic fan ON/OFF switching was even more crucial for continuously monitoring the temperatures. Temperature output and fan status are both produced by LCD displays. It is visible that the LCD panel is showing a temperature of 30 degrees Celsius and that the fan is now turned on. In fact, fan operation depends on the thresholds set. Set the value to 30 degrees Celsius. For example, when the temperature drops below 25 degrees Celsius, the fans will automatically turn off. You can see the display interface with breadboard and Arduino hardware.

FUTURE SCOPE

- This fan functions based on variations in temperature. Therefore, it can be used in many industrial units to cool off mechanical gears.
- The task of this contraption can be proliferated using other criterions such as humidity and light and simultaneously superintend these.
- We can affix various devices to this tool to command its functionality.
- This appliance is exquisite to operate in industrial and establishment sites.
- The commandment of this implement can be used in standing fans. So that, when the temperature is lower than the required temperature of this fan, the fan will stop running.
- This device will be fruitful for handicapped people. As this will work offhandedly, they don’t have to know how to manage this gadget.

CONCLUSION

The significance of Arduino UNO is that, we can have notably accurate control over the devices that are connected to it. This project involves the implementation of an Arduino-based temperature-controlled DC fan as well as the engineering and implementation of a fan speed control system to regulate the room's temperature.

Here, an Arduino board has been used to regulate the fan speed in accordance with the temperature sensed by the help of a DHT11 Temperature and Humidity Sensor. Additionally, the Arduino was successfully programmed to settle the speed of the fan, compare the room temperature to a reference temperature, and output the results over a Screen.

When the temperature rises over the threshold temperature, the fan turns "on," and when it falls below, it turns "off." It is therefore essentially an automated procedure.

This project can be used wherever internal temperature of circuit got to be stabilized or saving it from overheating. This will increase its efficacy and make it more practical for large areas extremely in warm weather. In conclusion, the apparatus has achieved its main objective of using an Arduino Uno and a
temperature controller to regulate the speed of a DC fan.

REFERENCE

[1] https://circuitdigest.com/microcontroller-projects/arduino-humidity-measuremen

[2] https://create.arduino.cc/projecthub/1NextPCB/temperature-controlled-fan-using-arduino-925f23

[3] https://www.slideshare.net/imraanbracu/automatic-room-temperature-controlled-fan-using-arduino-uno-microcontroller

[4] https://how2electronics.com/temperature-fan-speed-control-arduino/

APPENDIX

A. https://github.com/sanjidaaaziz/Temperature-controlled-DC-fan.git