ASSISTANCE FOR ANHYDROSIS PATIENTS

A MINI-PROJECT REPORT

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BONAFIDE CERTIFICATE

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INTERNAL EXAMINER **EXTERNAL EXAMINER**

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ABSTRACT

This project showcases an Arduino-based automatic room temperature control system that uses a temperature sensor to monitor the environment. Next, to provide a comfortable and energy-efficient environment, the Arduino adjusts the speed of a coupled DC fan motor based on the difference between the temperature that is sensed and a user-defined objective. Subsequent versions could look into different microcontrollers for possible large-scale manufacturing and integrate smartphone features, enabling companies, households, and individuals suffering from conditions like anhidrosis—which prevents them from sensing a room's temperature rise—to utilize this technology. It provides a more complete comfort solution than only fan-based temperature control by adding humidity control. With the use of specialized sensors, the system continuously checks the temperature and humidity. Each parameter has target values that can be defined by the user. After that, the Arduino analyses the data and acts in response to any deviations. Pulse Width Modulation (PWM) is used to adjust the fan speed in order to maintain humidity and introduce moisture. A motor is used to trigger the water sprinkler system. Using targeted changes, this combined strategy promises to potentially reduce energy use while producing a comfortable, cool, and humid environment.

LIST OF FIGURES

LIST OF ABBREVIATION

ABBREVIATION	ACCRONYM
IR - Sensor	Infra-Red Sensor
LCD	Liquid Crystal Display
I2C - Module	Inter Integrated Circuit

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

The huge network of physical objects integrated with sensors, software, and other technologies that communicate and share data with one another over the internet is known as the Internet of Things (IoT). This makes it possible for everyday objects to collect and share data, such as refrigerators and thermostats. Consider a temperature sensor that can control the fan speed. It would also read the temperature and help with cooling. Just a small sample of the potential of IoT is provided here. The Internet of Things has several advantages. Task automation, improved efficiency across industries, and real-time data collection for informed decision-making are all made possible by it.

It might be an endless struggle to keep your interior climate comfortable. Traditional methods frequently rely on inaccuracy and inefficiency caused by hand changes to fans or thermostats. This may result in uncomfortable swings in temperature, particularly in places with unpredictable weather. Also, these techniques frequently disregard humidity, which is an important aspect of personal comfort and general wellbeing. This project uses an Arduino microcontroller to create an automated climate control system, which is an innovative solution. Through the provision of a more thorough approach to comfort management, this system seeks to solve the shortcomings of conventional techniques. It will actively control humidity levels in addition to temperature, resulting in a cool, comfortable, and moist environment that may suit a greater variety of user preferences.

1.2 SCOPE OF THE WORK

The goal of this project is to use Arduino to construct a simple automated temperature control system. More than just a temperature that can be adjusted by a fan, what we really seek is a pleasant, cool, and atmosphere. An Arduino, temperature and humidity sensors, a fan with a motor driver, and a relay module will all be used. Users may set target settings for the temperature and humidity that the device will monitor. In order to preserve comfort, it will use these to modify the fan speed and turn on the water sprinklers. We'll put more time into the working prototype and essential functionality first. Monitoring humidity and temperature, adjusting fan speed, and ensuring dependable functioning are done.

1.3 PROBLEM STATEMENT

It can be quite difficult to keep an indoor environment that is both comfortable and well, particularly in regions with high temperatures. Conventional techniques frequently depend on manually adjusting fans or thermostats. These methods can be inaccurate and ineffective, which might result in uncomfortable temperature fluctuations. For those who suffer from anhidrosis, a disorder in which the body finds it difficult to sweat and regulate body temperature through sweating, this is particularly worrying. Anhidrosis can result in a sharp increase in core temperature, thus it's important to take in cold, idealized humidity for comfort and health.

To overcome these challenges, this project suggests creating an automated climate control system with an Arduino microcontroller. The main goal is to establish a comfortable and healthful indoor space, with emphasis on the needs of those who suffer from anhidrosis and the difficulties caused by hot weather. In comparison to conventional techniques, the system can provide a more thorough and specific approach to comfort management by automating modifications based on real-time sensor data.

The improvement could result in energy savings along with to its focus on increased comfort. Conventional techniques frequently call for extended cooling or dehumidifying times, which can be inefficient. The system may be able to reduce energy consumption without compromising a cozy and healthy atmosphere by automating modifications depending on user preferences and real-time sensor data.

1.4 AIM AND OBJECTIVES OF THE PROJECT

Maintaining a comfortable and energy-efficient room temperature can be a challenge. Manual adjustments to thermostats or fans are often imprecise and require constant monitoring. This can lead to discomfort and wasted energy consumption, especially in fluctuating climates. This project aims to address this issue by developing an automatic room temperature control system using an Arduino microcontroller. This project investigates the development of an automatic room temperature control system utilizing an Arduino microcontroller in an attempt to create a cozy and energy-efficient living area. A temperature sensor is used by this system to continuously sense its surroundings. The Arduino, which serves as the operation's brain, receives the data that has been gathered. The Arduino uses a method known as pulse width modulation (PWM) to operate a DC motor driver, which in turn modifies the speed of a connected fan based on the difference between the measured temperature and a user-defined target temperature. An LCD display adds functionality to the system by giving real-time temperature readings and possibly even allowing human input to change settings. All things considered, this project provides a useful and adaptable method of controlling room temperature.

CHAPTER 2

LITERATURE SURVEY

In [1], according to government recommendations 1, we may save 6% on energy costs by raising the temperature of any air conditioner by 1 degree. This study produced an affordable Internet of Things edge device that can be placed next to any air conditioner and will send out infrared signals to automatically set the temperature to twenty-four degrees. This automated temperature setting can highly help disabled people and can reduce the manual work that needs to be done. Energy savings is also done by using infrared rays to send signals to the air conditioner.

In [2],This study offered an unmatched approach and execution for controlling room temperature and automatically adjusting the pace of an electric heater. Several types of relay-dependent analog circuitries were employed prior to the application of contemporary clever technology to create smart room heaters and automation systems. Relay modules play a very important role in triggering the actions. They will denote the next action that needs to be done when some conditioned has been crossed or satisfied.

The study in [3], study describes a system for BP neural network-based sensor position optimization that includes a PC, microcontrollers, data transmission units, and digital temperature and humidity sensors. Experiments are conducted to verify the system, and the findings indicate that the relative humidity standard deviation is ± 0.5%RH and the temperature standard deviation is ± 0.3oC. Humidity sensors usually help to identify the moisture content and the dryness level of the air around us. It is mostly corelated with temperature.

According to [4], he Kingdom of Saudi Arabia is noted for having a very hot environment, with temperatures in the summer of above 50 °C. Modern agricultural technologies and innovative, sustainable solutions are the only ways to increase agricultural productivity. Lowering the immediate affect of external climate conditions in greenhouse farming is possible with the use of Internet of Things (IoT) technology. This research presents a highly adaptable intelligent system that uses Internet of Things (IoT) technology to control and monitor greenhouse temperature. This system's primary goal is to monitor the greenhouse's environment and adjust the inside temperature in order to use less energy.The greenhouse environment is monitored using a Petri Nets (PN) model, which also generates an appropriate reference temperature that is then sent to the temperature control block.

In [5], smart Healthier Schools (SHS) represent a novel approach to constructing school facilities that integrates the fields of quality of indoor air (IAQ), Internet of Things (IoT), and machine learning (AI) to effectively manage infection risks. During the time after the pandemic, it has become crucial to install a network of intelligent IoT sensors in schools. This is necessary to effectively monitor and manage the indoor air quality (IAQ) and reduce the danger of airborne transmission of various infections. These pathogens are indirectly linked to the levels of carbon dioxide (CO2) released by humans over a period of time. The issue of heat waste in winter owing to enhanced air renewal is still a significant worry.

The objective of this study in [6], was to create a system called blockchain-based Internet of Things (BIoT) that can automatically personalize indoor temperature control in a building management system (BMS). The system was designed to prioritize data privacy and security. A unique blockchain framework was suggested for the purpose of registering inhabitants and implementing a customized thermal sense vote (TSV) forecast model for training. This

framework also aims to regulate indoor temperatures while guaranteeing the confidentiality of both occupant and constructed data. The suggested BIoT heat control system can securely send upwards of 30,000 individual data for the TSV in prediction simultaneously utilizing a single PC.

According to [7] boarding homes offer the service of leasing living accommodations. An ideal boarding house ensures optimal temperature and humidity conditions. Increased humidity can cause harm to both the inside of a space and its occupants, necessitating closer monitoring. The author conducted study on monitoring both humidity and temperature using a smartphone application called Smart Life, focusing on Simpang Kost as the boarding home under investigation. The objective of the research is to use Internet of Things (IoT) sensors to oversee and autonomously address temperature and humidity issues in different spaces

The advancement of technology in [8], for communication and artificial intelligence has propelled the implementation of the IoT (Internet of Things), which in turn has fostered the growth of smart cities. The utilization of real-time and non-intrusive Internet of Things (IoT) air-conditioning data offers novel opportunities for investigating the fluctuating heat requirements in residential structures. Nevertheless, the data architecture of IoT significantly diverges from that of conventional sources. Hence, this study does a comprehensive analysis of the thermal energy requirements of residential structures at a regional level, utilizing Internet of Things (IoT) air conditioners. Initially, the framework for data preprocessing of the IoT cooling system was established.

With [9], we know that with increasing time spent in the workplace and a growing need for comfort, the office area is being modified to incorporate automatic control and monitoring of numerous factors. The article proposes an Internet of Things, or IoT, system that utilizes an arm controller and the Thingspeak cloud to automate the management of office space equipment, including light, fan, and AC, with a focus on ensuring human comfort. Office room factors such as light level, temperature, linked load, energy consumption, voltage, and current usage may be monitored and analyzed remotely over the internet.

In [10],with increasing time spent in the workplace and a growing need for comfort, the office area is being modified to incorporate automatic control and monitoring of numerous factors. The article proposes an Internet of Things, or IoT, system that utilizes an arm controller and the Thingspeak cloud to automate the management of office space equipment, including light, fan, and AC, with a focus on ensuring human comfort. Office room factors such as light level, temperature, linked load, energy consumption, voltage, and current usage may be monitored and analyzed remotely over the internet.

This study in [11], focuses on the advancement of an Internet of Things (IoT) platform to reduce energy usage in split-type air conditioners. It does this by regulating the airflow temperature and area temperature. The suggested system is specifically built to transmit local temperature data using the MQTT Protocol. It utilizes the Temperature Monitoring Algorithm to determine the appropriate circumstances for switching off the compressor. The governing elements considered are the supply air temperature of the air compressor and the room temperate in the actual operating area.

According to [12] ,the Internet of Things (IoT) is a rapidly emerging technology that enables automation in many sectors and commercial applications. Servers are commonly employed in enterprises to securely store sensitive and critical data. It operates continuously, 24 hours a day, 7 days a week, and is engaged in background

processing. It disperses a significant amount of heat, which can result in harm to the hardware and loss of data. Therefore, it is essential to have an air conditioner in the server room. The current mechanism utilized for this objective must be mechanized in order to regulate the temperature according to the specified criteria

In [13],advancements in IoT sensors, actuators, and smart home controllers now enable us to gather up-to-the-minute data on the condition of a house and make intelligent decisions that optimize the user's objectives in terms of comfort, convenience, environmental consciousness, and cost. Although thermal comfort is a top priority for many users, a large number of households employ a basic and wasteful method of maintaining a steady temperature through air conditioning. These systems fail to utilize energy-efficient and environmentally beneficial methods of temperature management, such as the strategic use of windows, window shades, and internal doors.

This system in [14], oversees and regulates temperatures in an underwater aquarium. This technology utilizes sensors to gauge the water's temperatures in a tank and subsequently employs a heating system and a cooling ventilator to regulate the water's humidity within a certain range of 25-27°C. The collected data is presented on ThingSpeak, a World of Things (IoT) platform. By utilizing this method, the user may retrieve this data from any intelligent device. ThingSpeak is an Internet of Things (IoT) analytics tool that enables users to analyze and visualize acquired data. The design incorporates extra functions, like water level sensors and LED lighting control.

According to [15],he ongoing COVID-19 pandemic has made it imperative to design efficient techniques for controlling the spread of COVID-19. Wearing face masks is a critical measure for preventing the spread of the illness and protecting oneself. The suggested technology is designed to surveil individuals who have been infected in densely populated public spaces such as shopping centers, wedding halls, workplaces, schools, or colleges. The anomalous temperature is recognized by the use of a sensor, and subsequently, the acquired signal is transmitted to the Arduino devices that is attached to the controller.

Advancements in IoT in [16],sensors, actuators, and smart home controllers now enable us to gather up-to-date data on the condition of a house and make intelligent decisions that optimize the user's objectives in terms of comfort, convenience, environmental consciousness, and cost. Although thermal comfort is a top priority for many users, a large number of homes employ a basic and inefficient method that involves uniformly cooling or heating the whole property. These systems fail to utilize energy-efficient and environmentally-friendly methods, such as adjusting windows, window shades, and internal doors, to regulate temperature.

This paper of [17], presents a way for effectively controlling the speed of a motorized fan component using a Smart iOS or Android phone. The purpose of this article is achieved by utilizing Espino and Arduino circuitry in the procedure. The Wi-Fi connection serves as a communication mechanism between the fan, Espino board, and

smart phone. The objective is to enhance an existing fan by transforming it into an intelligent fan, allowing the user to control the fan speed with their footsteps. The ultimate prototype fan design greatly enhances user-friendliness for older adults and others with disabilities. The suggested approach is straightforward and allows for potential enhancements.

The concept of Internet of Things in [18], or IoT for short, is employed to enhance the benefits of internet access. As long as the physical gadget is linked to the internet, the Internet of Things (IoT) may be employed to control it. This study utilizes the Internet of Things (IoT) to manage and monitor the relative humidity and temperature of the room of a fan. This is done using a mobile application, allowing users to remotely regulate the room using their smartphones prior to usage. Ensuring a consistently pleasant room temperature is crucial to enhance user productivity and prevent any health risks associated with temperature fluctuations.

.

CHAPTER 3

SYSTEM SPECIFICATIONS

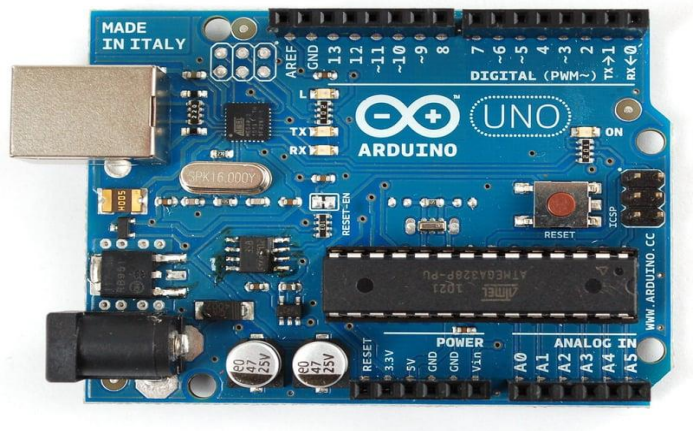
3.1HARDWARE SPECIFICATIONS

Processor	:	12 Generation intel core
LCD Display	:	16*2 board
Memory	:	256 GB
Module	:	I2c module
Board	:	Arduino Uno
Bread board	:	1
Jumper wires	:	As per requirement
Sensor 1	:	DHT11 sensor
Sensor 2	:	AH Humidity sensor

3.2 SOFTWARE SPECIFICATIONS

Arduino IDE : Version 2.3.2

The Arduino IDE is a flexible Integrated Development Environment specifically created for coding Arduino microcontroller boards. It provides a user-friendly interface for authoring, developing, and uploading code. It caters to both novices and expert users by using a simplified form of C/C++ syntax and being backed by a variety of conventional libraries and examples. The IDE is compatible with a range of boards made by Arduino and third-party versions. It allows for smooth development and execution of embedded projects, including necessary tools for library management, sketch uploading, and serial connection monitoring.



Arduino IDE is a crucial tool in the field of the IoT (Internet of Things) since it serves as a fundamental tool for creating linked devices and apps. The IDE simplifies the development of IoT solutions by allowing developers to create code that interacts with actuators, sensors, and other hardware components, thanks to its compatibility with boards made by Arduino and their peripherals. The Arduino IDE offers the essential architecture and libraries to simplify the development process, whether it involves gathering data from sensors in the environment, operating actuators such as motors or lights, or interacting with other devices in the Internet of Things or the cloud. In addition, its ability to interact with several connection modules, such as Internet access and Bluetooth, enables IoT developers to easily include connectivity capabilities into their projects, facilitating remote surveillance, control, and data sharing. Arduino IDE enables both IoT enthusiasts and experts to actualize their ideas, promoting innovation in the swiftly expanding realm of Internet-connected gadgets.

CHAPTER 4

MODULE DESCRIPTION

Adafruit_Sensor.h

The **Adafruit_Sensor.h** file serves as a crucial component within Adafruit's Arduino libraries for sensor modules. It functions by providing a unified interface for accessing sensor data, thereby simplifying the development process for projects utilizing a variety of sensors without necessitating the rewriting of code for each individual sensor. Within this header file, one typically encounters common functions and data structures essential for sensor readings. This includes the **Adafruit_Sensor** class, acting as a foundational base that furnishes common functionalities for all Adafruit sensors, defining methods for sensor data retrieval and event management.

DHT.h

The **DHT.h** file is a header file used in Arduino projects involving DHT series humidity and temperature sensors. This library provides functions and data structures to interact with DHT sensors easily. It typically includes functionalities such as reading temperature and humidity values from the sensor, handling communication with the sensor, and managing sensor settings.

DHT_U.h

The **DHT_U.h** file is an optimized version of the original DHT library (**DHT.h**) and provides improved performance and reduced memory usage. It offers similar functionalities for reading temperature and humidity values from DHT sensors but with optimizations for better efficiency.

When you include **DHT_U.h** in your Arduino sketch, you gain access to classes and functions specifically designed for interacting with DHT sensors. These include functions for initializing the sensor, reading temperature and humidity values, and handling errors or communication issues.

.

Wire.h

The **Wire.h** library is a standard Arduino library used for I2C communication. It provides functions to easily communicate with I2C devices, such as sensors, LCD displays, and other microcontrollers, using the I2C protocol. The **Wire.h** library is essential for working with I2C devices in Arduino projects and is commonly used in various applications, including robotics, sensor networks, and data logging.

The **LiquidCrystal_I2C.h** library is an extension of the standard LiquidCrystal library for Arduino, which provides an interface for controlling character LCD displays. The "I2C" suffix indicates that this library is specifically designed to work with LCD displays that communicate over the I2C (Inter-Integrated Circuit) serial protocol.

Inquire Module

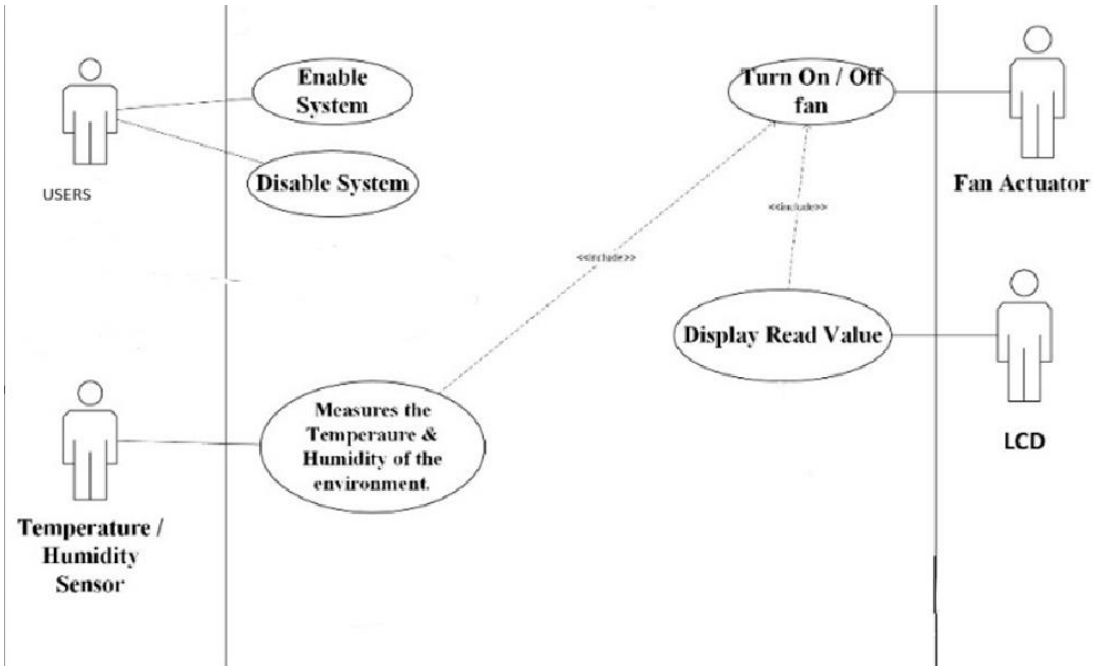
The "Inquiry Module" in the Antiquarian Book Store Management System serves as a crucial communication channel between customers and administrators. This module is designed to streamline the process of users inquiring about specific books, seeking additional information, and receiving timely responses from the store.

CHAPTER 5

SYSTEM DESIGN

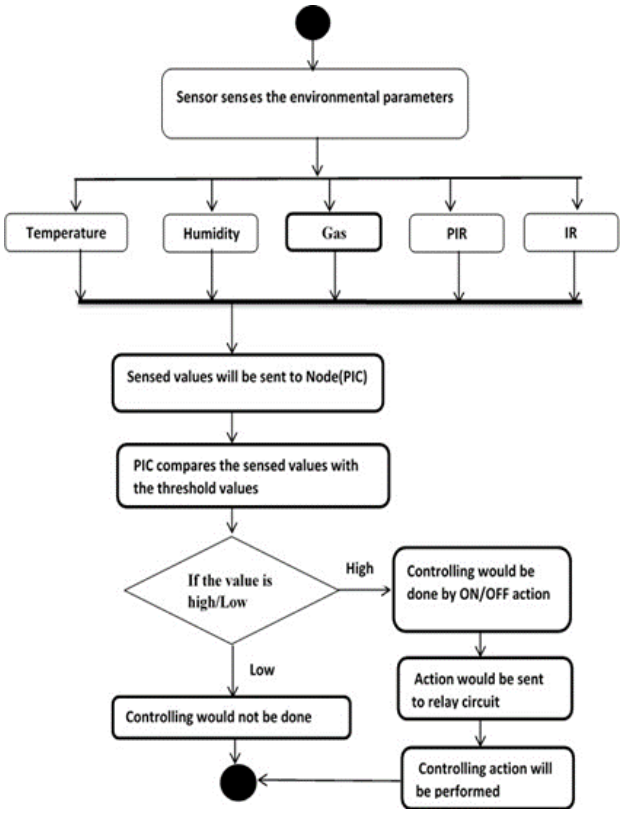
5.1. USECASE DIAGRAM

A use case is a list of actions or event steps typically defining the interactions between a role (known in the Unified Modelling Language as an actor) and a systemto achieve a goal. The actor can be a human or other external system.



5.2. ACTIVITY DIAGRAM

An activity in Unified Modelling Language (UML) is a major task that must take place in order to fulfil an operation contract. Activities can be represented inactivitydiagrams. An activity can represent: The invocation of an operation. A step in a business process.



CHAPTER 6

SAMPLE CODING

```
#include <Adafruit_Sensor.h>
#include <DHT.h>
#include <DHT_U.h>
#include <Wire.h>
#include <LiquidCrystal_I2C.h>


#define DHTPIN 7         // DHT11 sensor data pin
#define DHTTYPE DHT11    // DHT sensor type


#define MOTOR_PIN_ENA 9  // Enable pin for motor driver (PWM pin)
#define MOTOR_PIN_IN1 10  // Input pin 1 for motor driver
#define MOTOR_PIN_IN2 11  // Input pin 2 for motor driver


#define TEMPERATURE_THRESHOLD 29
#define TEMPERATURE_THRESHOLD1 32 // Temperature threshold
to adjust motor speed


DHT dht(DHTPIN, DHTTYPE);

LiquidCrystal_I2C lcd(0x27, 16, 2);  // Adjust the I2C address if
necessary


void setup() {
  Serial.begin(9600);
  dht.begin();

  Wire.begin();
  lcd.init();
  lcd.backlight();
  lcd.begin(16, 2);
  lcd.setCursor(0, 0);
  lcd.print("Temperature:");
```

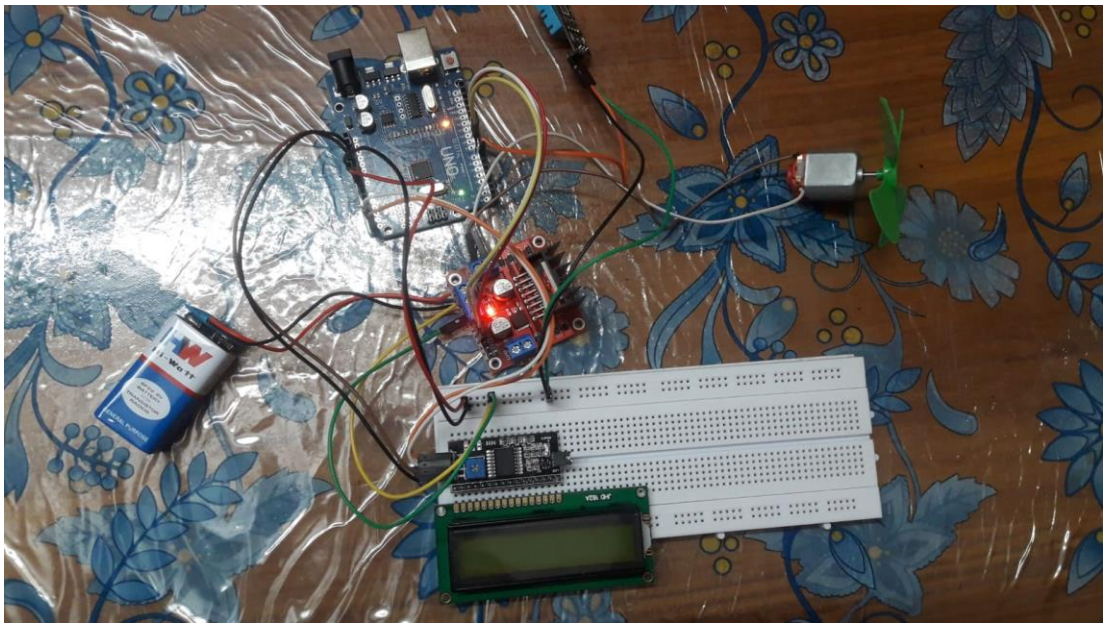
```
}

void loop() {
  delay(2000); // Delay between readings (adjust as needed)


  float temperature = dht.readTemperature(); // Read temperature in
Celsius
  if (isnan(temperature)) {
    Serial.println("Failed to read temperature from DHT sensor!");
    return;
  }

  Serial.print("Temperature: ");
  Serial.print(temperature);
  Serial.println(" °C");

  lcd.setCursor(0, 1); // Set cursor to the second line
  lcd.print("                "); // Clear the previous motor speed

  // Adjust motor speed based on temperature
  if (temperature > TEMPERATURE_THRESHOLD1) {
    // Increase motor speed
    analogWrite(MOTOR_PIN_ENA, 255);    // Set the motor speed to
maximum (255)
    digitalWrite(MOTOR_PIN_IN1, HIGH);  // Set motor direction
(forward)
    digitalWrite(MOTOR_PIN_IN2, LOW);
    lcd.setCursor(0, 1);
    lcd.print("Motor Speed: Max");
  }
  else if (temperature > TEMPERATURE_THRESHOLD) {
    // Increase motor speed
    analogWrite(MOTOR_PIN_ENA, 100);    // Set the motor speed to a
value (150)
    digitalWrite(MOTOR_PIN_IN1, HIGH);  // Set motor direction
(forward)
    digitalWrite(MOTOR_PIN_IN2, LOW);
    lcd.setCursor(0, 1);
    lcd.print("Motor Speed: Med");
  }
  else {
    // Decrease motor speed
    analogWrite(MOTOR_PIN_ENA, 45);    // Set the motor speed to a
```

```
lower value (150)
    digitalWrite(MOTOR_PIN_IN1, HIGH);  // Set motor direction
(forward)



    digitalWrite(MOTOR_PIN_IN2, LOW);
    lcd.setCursor(0, 1);
    lcd.print("Motor Speed: Low");
  }


  lcd.setCursor(12, 0); // Set cursor to the temperature position on the first
line
  lcd.print(temperature); // Print temperature
}
```

CHAPTER 7

SCREEN SHOTS

```
Temperature:  37.40  °C
Temperature:  37.40  °C
Temperature:  37.40  °C
Temperature:  37.40  °C
Temperature:  37.40  °C
```



CHAPTER 8

CONCLUSION AND FUTURE ENHANCEMENT

The utilization of Arduino technology in the construction of an autonomous room temperature management system represents a noteworthy progress towards attaining comfort and energy efficiency in indoor settings. This system optimizes energy efficiency by utilizing temperature sensors and DC fan motors to provide a comfortable environment.

In the future, upcoming versions might prioritize improving the capacity to handle larger workloads and making it easier for more people to use. Investigating alternative microcontrollers that are appropriate for large-scale production has the potential to optimize manufacturing procedures and lower expenses, therefore increasing the accessibility of this technology to both enterprises and homes. Incorporating smartphone capabilities would allow for remote monitoring and control, hence improving ease and usefulness. The potential utilization of this technology goes beyond just providing comfort, and instead provides substantial advantages to those with certain health issues such as anhidrosis. This technology has the ability to enhance the quality of life for individuals by catering to their specific requirements and guaranteeing adequate temperature control.

In summary, this project is a significant advancement in the development of intelligent and environmentally-friendly methods for regulating interior climate. It has the capacity to bring about favorable changes in several industries, such as housing, business, and healthcare.

Integrating more sensors, apart from temperature, in future iterations might greatly expand the possibilities of the autonomous room temperature management system. By integrating humidity sensors, the system can effectively consider the moisture content in the air, thereby assuring a comfortable and mold-free interior environment. Incorporating sensors to measure air quality indicators such as carbon dioxide (CO2), volatile organic compounds (VOCs), and particle matter (PM) would allow the system to effectively monitor the levels of indoor air pollution. This data may be employed to trigger ventilators or air purifiers when pollution levels surpass predetermined limits, therefore enhancing indoor air quality and fostering occupant well-being.

In addition, the integration of occupancy sensors would allow the system to accurately detect the presence of humans in the space. By utilizing this information, the system has the ability to modify temperature settings according to occupancy patterns, so optimizing energy use and enhancing comfort levels. As an illustration, the system has the capability to decrease the temperature while there are no people in the room in order to save energy, and then increase it to the appropriate level once it detects the return of residents. Integrating sensors and incorporating adaptive learning algorithms might greatly enhance the platform's performance and user experience. These algorithms may examine past data on temperature choices, occupancy patterns, and outside factors in order to create prediction models. Through iterative improvement of these models using real-time input, the system has the ability to adaptively regulate fan speed, temperature setpoints, and other variables in order to accurately predict and fulfill the requirements of the occupants. This adaptive methodology will not only improve comfort but also optimize energy efficiency by adjusting the system's functioning in accordance with changingconditions.

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