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Automatic Temperature Based DC fan Speed Controller Using Arduino

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ABSTRACT: In present scenario, availability of electricity is found to reach crucial stage. To protect and safeguard one's future we need to save the energy as a slogan suggest "One unit saved is one unit generated". This report aims to give an overview of a standalone automatic fan speed controller that controls the speed of an electric fan according to our requirement. The temperature-based fan speed control system can be done by using an Arduino board. Now Arduino board is very progressive among all electronic circuits, thus we employed the Arduino board for fan speed control. The proposed system is designed to detect the temperature of the room and send that information to the Arduino board. Then the Arduino board executes the contrast of current temperature and sets the temperature based on the inbuilt program of the Arduino.

KEYWORDS: Arduino, DC Fan, Temperature Sensor, Connected with LCD.

I. INTRODUCTION

A Temperature Controlled DC Fan is a system which automatically turns on a DC Fan when the ambient temperature increases above a certain limit. Every day, new intelligent systems are being introduced as a result of technological innovation. Everything is becoming more complex and understandable. Modern technology and intelligent electronic systems are in higher demand. Due to its advantages of low cost and power consumption, the electric fan is one of the most popular electrical devices. By pressing the switch button, the fan can be physically turned on and off. The fan speed will not currently alter in response to changes in temperature. Therefore, a technology for an automatic temperature control system is required to adjust the fan's speed in response to temperature changes. An alternative method of controlling the speed of the motor is by temperature change in the fan. This project involves the design and simulation of a fan speed control system that is temperature-based. A temperature sensor can be used to determine the room's temperature. It has been utilized to measure the room's temperature, and Arduino technology is used to adjust the fan speed in accordance with the temperature.

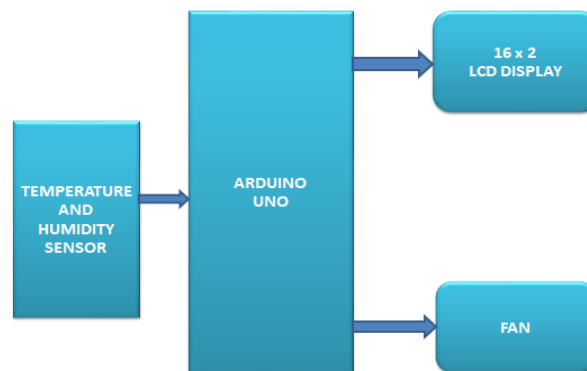
II. RELATED WORK

The conventional method of controlling the speed of the fan is by using regulator. Through this conventional method the electrical energy consumption is more compared to using LM35 sensor. From the research of Tito smailagich, as per the high cost of electrical power consumption by replacing the conventional method of ON/OFF switch reduce the consumption of electrical energy and increases the efficiency of power consumption, as a result of which saves energy and money. Articles published by the Lawrence Berkeley National Laboratory as mentioned that the manufacturing sector alone fans are using about 78.7 billion kilowatt - hours energy every year. From this article we can conclude that the consumption of this is amount to 15% of electricity consumption is done by motor alone. So by going through these above mentioned articles this project replaces conventional type of regulator with LM35 sensor as well as increases or decreases the speed of the fan with respect to room temperature resulting in less energy consumption and the energy saved can be used else where.

Power Consumption Rate of India The U.S. Energy Information Administration provides data for India from 1980 to 2015. The average value for electricity consumption of India during that period was 15.1 billion kilowatt-hours with a minimum of 1.8 billion kilowatthours in 1980 and a maximum of 46.17 billion kilowatt hours in 2004.

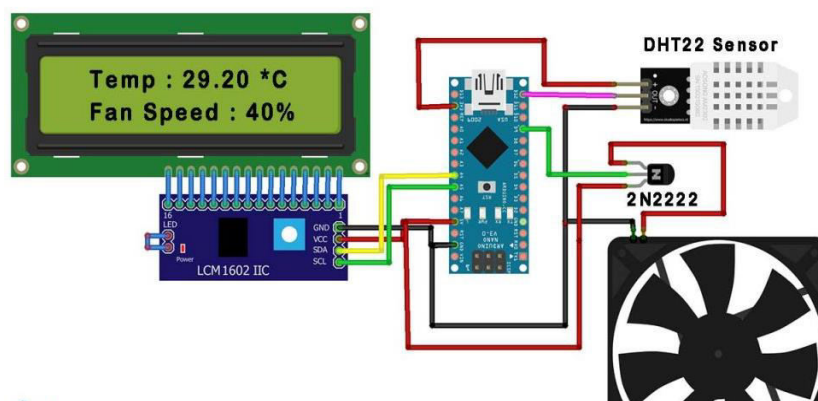
Review of Relevant projects There are some abstractions of publications which are relevant to our proposed system. According to those publications we have included the information about existing system. The existing system has scope of upgrade. And existing system has some limitations. We have gathered lot of information from the literature and have discussed here. The information we have gathered which are about Automatic control fan using various electronic component and Arduino as well. We have got additional knowledge from particular publication about human sensing device. We have gathered knowledge about our proposed system from some article as well which has been published by an organization.

III. METHODOLOGY



The above figure represents the block diagram representation of the proposed concept. The temperature sensor DHT11 is interfaced with Arduino to fetch the data of temperature in the room. The data is processed if the temperature is high fan speed is more relatively if the temperature is low fan speed is low. Moreover if the temperature is below the threshold set then fan will be in off condition. The data related to temperature, fan speed is displayed on the LCD for user interaction. The fan speed is controlled relatively with the temperature using PWM pins available on the Arduino. As duty cycle PWM signal increases the fan speed increases and the same is true conversely.

The circuit connections of Temperature Based Automatic Fan Speed Controller using Arduino is very easy. Here 16x2 I2C LCD is directly interfaced to Arduino using A4 and A5 pins. LCD is used for displaying temperature and Fan speed Status. The DHT22 sensor module is connected to the D12 pin of Arduino. Similarly, the D9 pin is used for controlling fan speed through the 2N2222 NPN transistor.

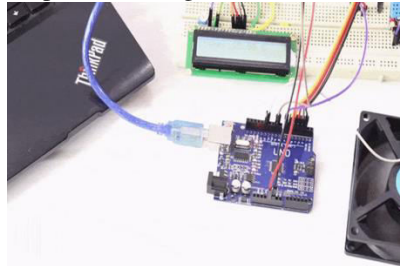


Circuit Diagram

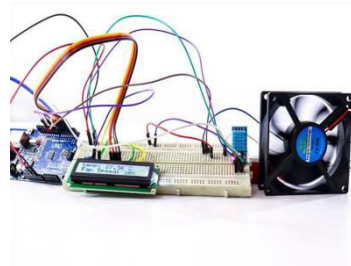
IV. EXPERIMENTAL RESULTS

HARDWARE IMPLEMENTATION

The figure (a) (b) depicts the hardware implementation of the proposed concept. The motor at present is running at maximum speed as the temperature is high.



(a)



(b)

SOFTWARE IMPLEMENTATION

The program for Temperature Based Fan Speed Control & Monitoring With Arduino is given below. Simply copy this code and paste it in your Arduino IDE. Then compile the code and then upload it. Before writing the code, please refer to the below Table.

PWM Values vs Speed

Temperature	Duty Cycle	PWM Value	Fan Speed
Less 26	0%	0	Off
26	20 %	51	20%
27	40%	102	40%
28	60%	153	60%
29	80%	204	80%
Greater 29	100%	255	100%

We included the libraries for the DHT22 sensor and for the LCD. The libraries will help to make the code easier. Since we are using libraries, we must make sure that the libraries we are using are installed in our Arduino IDE. To install in the Arduino IDE, go to the Sketch tab, drop down to Include Library, and click Manage Library. In the Library Manager search for DHT and LiquidCrystal then install.

```
#include "DHT.h"
#include "LiquidCrystal.h"
```

SOURCE CODE

```
//NextPCB
#include "DHT.h"
#include <LiquidCrystal.h>
LiquidCrystal lcd(7, 6, 5, 4, 3, 2);
#define DHTPIN 12 // what pin we're connected to
#define DHTTYPE DHT11 // DHT 11 #define pwm 9byte degree[8] =
{
    0b00011,
    0b00011,
    0b00000,
```




```

        0b00000,
        0b00000,
        0b00000,
        0b00000,
        0b00000
    };
// Initialize DHT sensor for normal 16mhz Arduino
DHT dht(DHTPIN, DHTTYPE);void setup() {
    lcd.begin(16, 2);
    lcd.createChar(1, degree);
    lcd.clear();
    lcd.print(" Fan Speed ");
    lcd.setCursor(0,1);
    lcd.print(" Controlling ");
    delay(2000);
    analogWrite(pwm, 255);
    lcd.clear();
    lcd.print("Robu ");
    delay(2000);
    Serial.begin(9600);
    dht.begin();
}void loop() {
    // Wait a few seconds between measurements.
    delay(2000); // Reading temperature or humidity takes about 250 milliseconds!
    // Sensor readings may also be up to 2 seconds 'old' (its a very slow sensor)
    float h = dht.readHumidity();
    // Read temperature as Celsius
    float t = dht.readTemperature();
    // Read temperature as Fahrenheit
    float f = dht.readTemperature(true);

    // Check if any reads failed and exit early (to try again).
    if (isnan(h) || isnan(t) || isnan(f)) {
        Serial.println("Failed to read from DHT sensor!");
        return;
    } // Compute heat index
    // Must send in t in Fahrenheit!
    float hi = dht.computeHeatIndex(f, h); Serial.print("Humidity: ");
    Serial.print(h);
    Serial.print(" %\t");
    Serial.print("temperature: ");
    Serial.print(t);
    Serial.print(" *C ");
    Serial.print(f);
    Serial.print(" *F\t");
    Serial.print("Heat index: ");
    Serial.print(hi);
    Serial.println(" *F"); lcd.setCursor(0,0);
    lcd.print("temp: ");
    lcd.print(t); // Printing terature on LCD
    lcd.print(" C");
    lcd.setCursor(0,1);
    if(t <20 )
    {
        analogWrite(9,0);
        lcd.print("Fan OFF ");
    }
}

```

```

delay(100);
}

else if(t==26)
{
    analogWrite(pwm, 51);
    lcd.print("Fan Speed: 20%  ");
    delay(100);
}

else if(t==20)
{
    analogWrite(pwm, 102);
    lcd.print("Fan Speed: 40%  ");
    delay(100);
}

else if(t==28)
{
    analogWrite(pwm, 153);
    lcd.print("Fan Speed: 60%  ");
    delay(100);
}

else if(t==29)
{
    analogWrite(pwm, 204);

    lcd.print("Fan Speed: 80%  ");
    delay(100);
}
else if(t>29)
{
    analogWrite(pwm, 255);
    lcd.print("Fan Speed: 100%  ");
    delay(100);
}
delay(3000);
}
    
```

IV. CONCLUSION

We have implemented an automatic text detection technique from an image for Inpainting. Our algorithm successfully detects the text region from the image which consists of mixed text-picture-graphic regions. We have applied our algorithm on many images and found that it successfully detect the text region.

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