Temperature Based Fan Speed Controller Using Arduino

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Abstract: Day by day, there are different types of intelligent systems are introduced with the improvement in technology. Everything is getting more intelligible and stylish. There is a growth in the demand of cutting edge technology and also smart electronic systems. In the proposed systems, microcontroller plays a vital role in the smart systems development. Micro controllers have become an essential part in the preset technologies that are being presented daily. This article discusses temperature based fan speed controller. This system is used to control the speed of the fan automatically based on the room temperature. The system uses an Arduino board to implement a control system Since this system is proposed to control the fan and is very important to know Arduino controlled system well. The study was conducted with the design and manufacture of Automatic Fan Control System.

Keywords: Arduino:DTH11:Fan

I. INTRODUCTION: Temperature Based Fan Controller And Monitoring With Arduino" outlines the project's significance and objectives, emphasizing the need for energy-efficient control systems. It introduces the concept of using temperature sensors and feedback control to optimize fan speed based on temperature requirements. Key components like Arduino, temperature sensors, and an LCD display are discussed, highlighting their roles in creating a user-friendly system. Arduino's advantages as the microcontroller are mentioned. The idea behind the project is to control the speed of the fan by difference in temperature. The Temperature variation in the fan is an different way to deal with the speed of the motor[1]. It is a process in which the objects temperature is measured and the way of heat energy passes into or out of the object is correctly adjusted to achieve a stable temperature[2]. This project attendances the design and simulation of the fan speed control system by using PWM technique based on the room temperature. How the room temperature can be measured? The answer to the simple question is with the

help of a Temperature Sensor. It has been used to measure the temperature of the room and the speed of the fan is varied according to the room temperature using Pulse Width Modulation technique[3-4]. With the advancement in technology, intelligent systems are introduced every day. Everything is getting more sophisticated and intelligible. There is an increase in the demand of cutting edge technology and smart electronic systems. Microcontrollers play a very important role in the development of the smart systems as brain is given to the system. Microcontrollers have become the heart of the new technologies that are being introduced daily[5]. A microcontroller is mainly a single chip microprocessor suited for control and automation of machines and processes. Today, microcontrollers are used in many disciplines of life for carrying out automated tasks in a more accurate manner. Almost every modern day device including air conditioners, power tools, toys, office machines employ microcontrollers for their operation. Microcontroller essentially consists of Central Processing Unit (CPU), timers and counters, interrupts, memory, input/output ports, analog to digital converters (ADC) on a single chip. With this single chip integrated circuit design of the microcontroller the size of control board is reduced and power consumption is low. This project presents the design and simulation of the fan speed control system using PWM technique based on the room temperature[6-7]. A temperature sensor has been used to measure the temperature of the room and the speed of the fan is varied according to the room temperature using PWM technique. The duty cycle is varied from 0 to 100 to control the fan speed depending upon the room temperature, which is displayed on Liquid Crystal Display. With the advancement in technology, intelligent systems are introduced every day. Everything is getting more sophisticated and intelligible. There is an increase in the demand of cutting edge technology and smart electronic systems[8-9].

II. LITERATURE REVIEW

In frequently electric fan utilization is squandering force as a result of human demeanor. Human additionally generally requests something that effortlessly to be utilized without squandering vitality. To minimize or diminish the force use this venture added to a programmed framework where pace is controlled by the room temperature The microcontroller has programmed fan framework displayed in this venture is obliged to satisfy the necessity of advances tomorrow will be more receptional than today The electric fan naturally witches the pace per the earth temperature changes This electric fan framework contains mix of sensor, controller, driver and engine with incorporation of installed controlled programming.

III. Components Description

Arduino*:*

Microcontroller: the ATmega328p is the Arduino brain. Everything on the Arduino board is

meant to support this microcontroller. This is where you store your programs to tell the Arduino what to do. Digital pins: Arduino has 14 digital pins, labelled from 0 to 13 that can act as inputs or outputs. When set as inputs, these pins can read voltage. They can only read two states: HIGH or LOW.When set as outputs, these pins can apply voltage. They can only apply 5V (HIGH) or 0V (LOW).

Arduino IDE:

We use the software Arduino IDE to implement this project. How to control the output and the input.

Figure 1:Arduino

Temperature Sensor (DTH11):

DTH11 is a temperature measuring device having an analog output voltage proportional to the temperature. It provides output voltage in Centigrade (Celsius). It does not require any external calibration circuitry. It is a 3-terminal sensor used to measure surrounding temperature ranging from -55 °C to 150 °C.
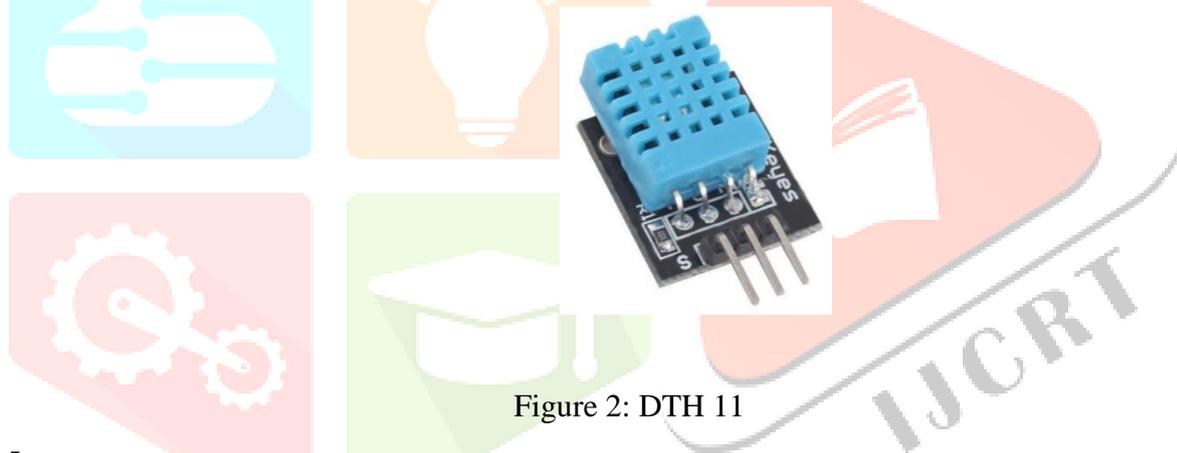

Figure 2: DTH 11

DC Motor:

A DC motor is any of a class of rotary electrical motors that converts direct current electrical

energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic; to periodically change the direction of current in part of the motor. Larger DC motors are currently used in propulsion of electric vehicles, elevator and hoists, and in drives for steel rolling mills.

Battery:

Batteries are a collection of one or more cells whose chemical reactions create a flow of electrons in a circuit. All batteries are made up of three basic components: an anode (the '-' side), a cathode (the '+' side), and some kind of electrolyte (a substance that chemically reacts with the anode and cathode).When the anode and cathode of a battery is connected to a circuit, a chemical reaction takes place between the anode and the electrolyte. This reaction causes electrons to flow through the circuit and back into the cathode where another chemical reaction takes place. When the material in the cathode or anode is consumed or no

longer able to be used in the reaction, the battery is unable to produce electricity. At that point, your battery is "dead."

IC Motor Driver (L298D):

L298 is a typical Motor driver or Motor Driver IC which allows DC motor to drive on either

direction. L298 is a 16-pin IC which can control a set of two DC motors simultaneously in any direction.

Can be used to run Two DC motors with the same IC.

 Speed and Direction control is possible

 Motor voltage Vcc2 (Vs): 4.5V to 36V

 Maximum Peak motor current: 1.2A

 Maximum Continuous Motor Current: 600mA

Supply Voltage to Vcc1(Vss): 4.5V to 7V

Figure 3: IC Motor Driver

IV. METHOGOLOGY

Temperature sensor DTH11 senses the temperature and converts it into an electrical (analog) signal, which is applied to the ATmega328 microcontroller of Arduino UNO Board. The analogue value is converted into digital value. Thus, the sensed values of the temperature and

speed of the fan are compared with the threshold value and when temperature exceeds threshold value the fan starts rotating.
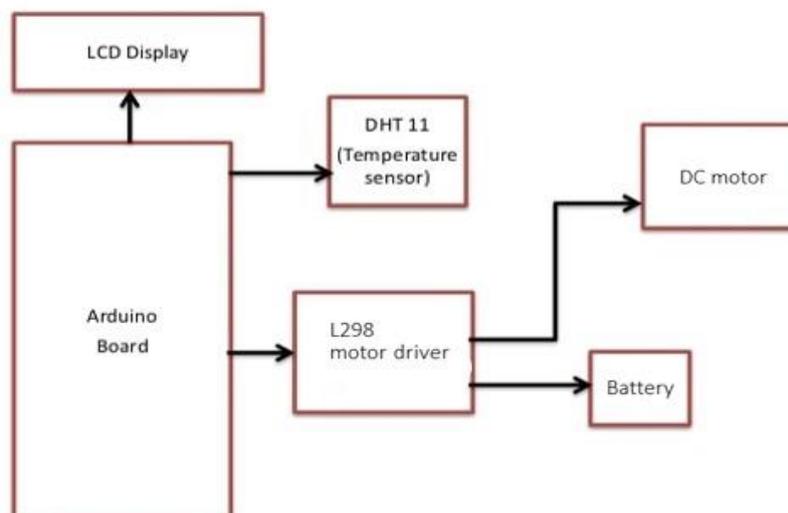

Figure 4: Block diagram

V. RESULT

The electric fan operates automatically according to temperature rises in order to compensate the rise in the temperature fan running full speed when the temperature returns back to the normal temperature fun running normal speed .The input is taken from a temperature sensor

The output pins are connected to LEDs. The control pins of the DTH11 is connected to the arduino. The time taken by the Arduino to convert analog data into digital form is dependent on the frequency of clock source. Different value for temperature representation are selected, which in turn provided to display port .Display port includes LCD display devices.Temperature and fan speed is showing. When the temperature of surrounding increases, temperature of thermistor as increases which causes its resistance to decrease, therefore voltage divider circuit causes more voltage. Thus the output voltage increases causing speed of fan to increase.
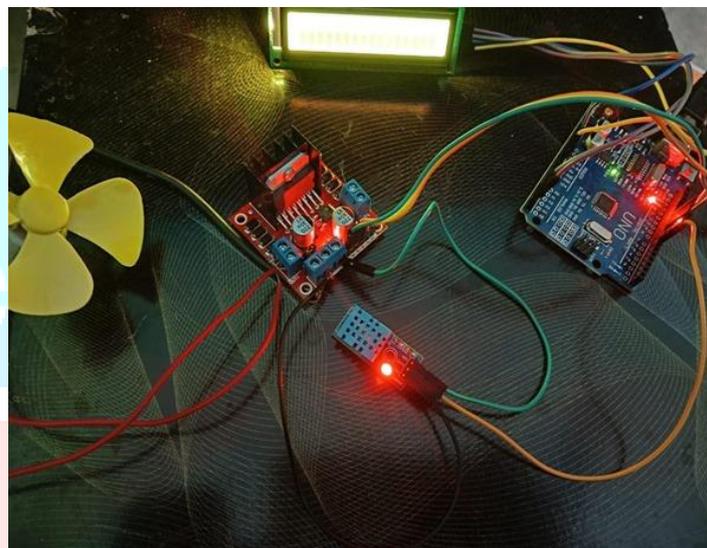

Figure 5: Prototype model

VI. CONCLUSION

We have created a set-up for automatic regulation of the fan's speed based on the temperature using an Arduino UNO Microcontroller. The temperature is detected by the temperature and humidity sensor (DHT11). The fan speed and the temperature are shown on the LCD. The velocity of the fan varies as per the temperature, thus, eliminating the need to regulate the fan speed manually repeatedly. This method may be utilized in the home as well as in the workplace. The system is operating well, and the design is appropriate for modern needs and technology. We have successfully achieved our objective. There are no errors in the system. The system is quite simple to set up in workplaces, homes, and other places. At low temperatures, it will save energy by slowing down the fan's pace. Because of its simplicity, ease of use and implementation, cheap cost, low power consumption, and minimal hardware and software requirements, the system presented in this paper is efficient and marketable.

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