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AUTOMATIC TEMPERATURE BASED FAN SPEED CONTROLLER USING ARDUINO

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Abstract: This project investigates the design and implementation of an automatic temperature-based fan speed controller with digital use a fan speed controller Arduino. The system employs a temperature sensors to continuously monitor the ambient temperature, and Arduino microcontroller processes this data to dynamically adjust fan speed accordingly. By integrating a feedback loop, the controller ensures efficient cooling while minimizing energy consumption. The project aims to provide a cost-effective and user-friendly solution for maintaining optimal temperature conditions in various environments, contributing to energy efficiency and automated

Keywords: Temperature, Fan, Speed, PWM.

I. INTRODUCTION

The "Automatic Arduino-Based Temperature-Based Fan Speed Controller" project introduces a sophisticated yet practical application of modern electronics and microcontroller technology. In the pursuit of enhanced energy efficiency and personalized comfort, this project focuses on creating an intelligent system that automatically adjusts the speed of a fan based on real-time environmental conditions. Leveraging the capabilities of Arduino, a versatile microcontroller platform, this endeavor merges hardware interfacing, sensor integration, and software programming to orchestrate an efficient and responsive fan control mechanism. Because of its low power consumption and inexpensive cost, electric fans are among the most common electrical gadgets. It is a common circuit that finds utility in a variety of applications. In the view of most practical ways to provide a comfortable and energy-efficient environment. In truth, the fan has long been utilized and is still available on the market. The fan can be manually regulated by pressing the switch. In this method, any temperature change does not result in a change in fan speed. Except for the consumption, the speed of the fan can be changed manually. Consequently, in order to respond to temperature variations, the fan speed needs to be adjusted using an automated temperature control system.This project includes the entire design and modeling of the PWM-based automatic fan speed control system that is based on room temperature.A temperature sensor was used to measure the temperature of the room, and the fan speed was changed based on the temperature using the PWM method. The overall duty cycle is set between 0 to100 to manage the fan speed controll based on the surrounding temperature, which is displayed on the LCD . PWM, or pulse width modulation, is a technique for producing analog results means. Digital control is used to produce a square wave, which is a signal that alternates between on and off. Microcontrollers are crucial in the creation of smart systems because they provide the system with a brain. Microcontrollers have evolved into the heart of the new evolving technologies that are being presented on a daily basis.

Fig1.1.Illustrate the block diagram of IoT.

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II. RELATED WORK

Though, this is not a conveying of information. Depending on the application implementation utilized and the system design complexity, users can additionally conduct some processes that create results. For instance, to observe the changes that happens in the humidity of the air conditioner with the help of technology invented by IoT, the user can able to make the adjustments Users can monitor temperature fluctuations using their mobile app.

Home Automation Systems presently focus on Smart Phone based utilization as the easiest way to associate with the Smart Home appliances. Nevertheless, this has not always been the situation. It has discharged from different architectures and systems into the developed architecture it is now. In this regard following Papers were considered and the technologies were differentiated.

Home automation that are based on IoT utilizing an Android applications.[1]. The authors suggested that devices are secured and safe overall . Here the user can send commands from the android mobile to the Arduino controller to control the home appliances. The main interest of this proposed work is to control the voltage levels of house hold appliances like we can control the speed of the fan or light intensity of the lights etc and we can also get the status of all the devices which are controlled by Arduino controller through our smart phones . This paper is developed to help for physically handicapped people. Mobile based Internet of Things (IoT) [2]. In this paper, the authors demonstrated about how IoT works and how it can be used to control house hold appliances by using Arduino based microcontroller and smart phone apps. Real-time smart home automation powered by PIC microcontrollers, Bluetooth, and Android technology [3]. In this paper authors proposed smart home automation using PIC technology and this system is fully operational features to control different appliances. IoT based monitoring and control system for home automation [4]. This paper proposes an efficient implementation of IoT, which is used for monitoring the house hold devices through smart phone using low power communication protocols such as Wi-Fi, Zigbee and raspberry pi as a server.

III. METHODOLOGY

Choose a sensor like a thermistor or a digital temperature sensor (e.g., DS18B20) to measure the ambient temperature. Opt for a microcontroller like Arduino or Raspberry Pi to process the temperature data and control the fan speed accordingly. Select a DC fan with multiple adjustable speed capability. Alternatively, you can use a motor driver to control the speed of an AC fan. Incorporate an LCD display or LEDs to show the currently observed temperature and regulation of the fan. Ensure a stable power source for the microcontroller, sensors, and fan.

Design the circuitry to connect the temperature sensor, microcontroller, fan, and power supply. Include necessary components like resistors, capacitors, and transistors. Write code to read temperature data from the sensor and adjust the fan speed accordingly. Implement algorithms to determine the motion of the fan based on surrounding temperature thresholds. Test the system in various temperature conditions and calibrate it to ensure accurate temperature reading.

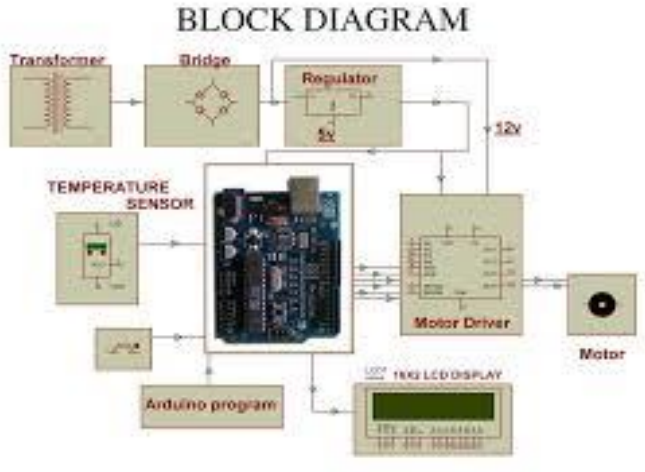

Fig3.1.System block diagram.

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IV. HARDWARE DESCRIPTION

4.1 ARDUINO NANO:

The Arduino Nano is a tiny and flexible microcontroller board from the Arduino series. It is based on the ATmega328P microcontroller and provides similar functionality to the Arduino Uno, but in a smaller compact factor. Its small size makes it excellent for tasks with limited area or those that require a lightweight, portable solution.

Despite its compact size, the Arduino Nano retains the majority of the capabilities present on larger Arduino boards. It contains 14 digital input/output pins, 8 analog pins, and supports I2C, SPI, and UART communication protocols. A USB interface enables simple programming and communication with a computer. The Nano is fueled either a Mini-B USB cable , allowing for flexibility in its power source

The Arduino Nano is programmed using the Arduino Integrated Development Environment (IDE), which provides a simplified version of the C++ programming language. The Nano allows users to write and upload code to control sensors, actuators, and other electronic components. Its adaptability and interoperability with a wide selection of sensors and shields make it a popular choice for prototyping and developing interactive projects among enthusiasts, students, and professionals alike.

To summarize, the Arduino Nano is a powerful yet small microcontroller board tht is used in a wide range of electronic applications. Its tiny form factor, large pinout, and connectivity with the help of Arduino environment make it a better option both novice and expert developers working on projects ranging from basic LED displays to complicated robotics.

It implemented a class called `ObjectiveTest` that generates multiple-choice questions based on trivial sentences extracted from a text summary. The class takes raw data and the number of questions to be generated as input and provides methods to identify trivial sentences, generate questions, and answer options.Here's a breakdown of the key methods in the class.

Fig4.1.Arduino NANO.

4.2 ARDUINO IDE:

The open-source Arduino Software (IDE) simplifies code creation and board uploading. It's compatible with Windows, Mac OS X, and Linux. The Java-based platform is built on open-source tools, including Processing. This program is compatible with all Arduino boards. The Arduino development environment includes a text editor, message area, text console, toolbar with buttons for common tasks, and menus. It communicates with the Arduino hardware and allows for program uploading. Sketches are pieces of software written for the Arduino. These sketches are created using the text editor. Sketches are saved using the.ino file extension. It allows for text cutting and pasting, as well as searching and replacing.

The message box provides feedback for storing and exporting, as well as faults. The console shows text from the Arduino environment, including error messages and other data. The bottom right corner of the window displays the current board and serial port.

4.3 LIQUID CRYSTAL DISPLAY:

LCD (Liquid Crystal Display) screens are used in a variety of applications. A 16x2 LCD display is a simple module widely utilized in numerous devices and circuits. These modules outperform seven and other multi-segment LEDs. LCDs are cost-effective, easy to program, and capable of displaying bespoke characters, animations, and more.

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A 16x2 LCD displays 16 characters per line across two lines. This LCD displays each character in a 5x7 pixel grid. This LCD has two registers: Command and Data. The command register stores LCD commands. A command instructs the LCD to perform certain tasks such as initializing, clearing the screen, establishing the cursor location, and controlling the display. The data register holds data that will be presented on the LCD. The data represents the ASCII value of the character to display on the LCD.

4.4 DHT22 SENSOR :

The DHT22 sensor is a digital temperature and humidity sensor commonly found in electronics projects and environmental monitoring. Also known as AM2302, it utilizes a capacitive humidity sensor and a thermistor to measure ambient temperature and humidity with high precision. The sensor communicates via a single-wire digital interface, providing accurate and reliable data. Its compact size, low power consumption, and cost-effectiveness make the DHT22 are used in the applications such as weather stations, home automation, and control system.

One notable feature of the DHT22 is that the ability to provide real-time temperature and humidity readings in a compact and cost-effective package. Its ease of use and compatibility with microcontrollers make it a popular choice among hobbyists and professionals alike. Whether incorporated into weather stations or integrated into smart home systems, the DHT22 sensor contributes various types of applications significantly to improving environmental sensing capabilities.

Fig4.4.DHT22Sensor.

V. RESULT ANALYSIS

The temperature based automatic fan speed controller is a project designed to regulate fan speed based on environmental conditions, typically temperature. The analysis of its results involves assessing the system's effectiveness in maintaining optimal conditions. By monitoring temperature levels and adjusting fan speed accordingly, the controller aims to achieve energy resources and enhance user comfort. Evaluating the project's success requires considering factors such as responsiveness to temperature changes, the reliability of sensor readings, and the overall efficiency of the Arduino code. Additionally, hardware integration and the user interface, if applicable, contribute to the comprehensive analysis of the fan speed controller's performance.

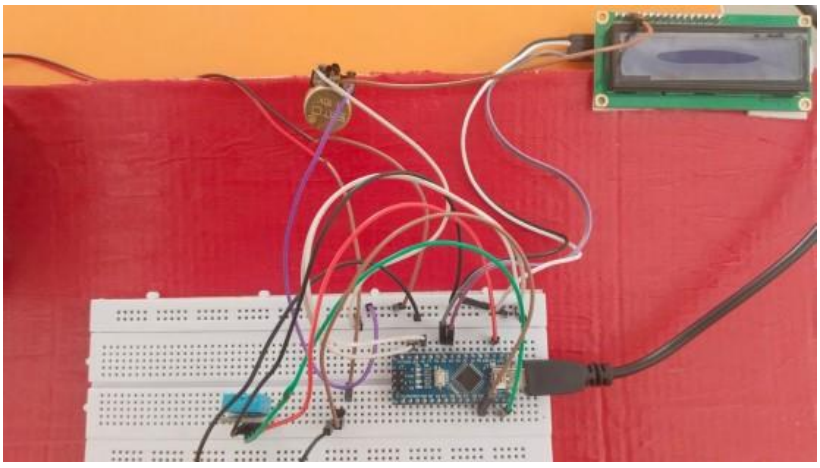

Fig5.1.LCD and Sensor is connected with arduino.

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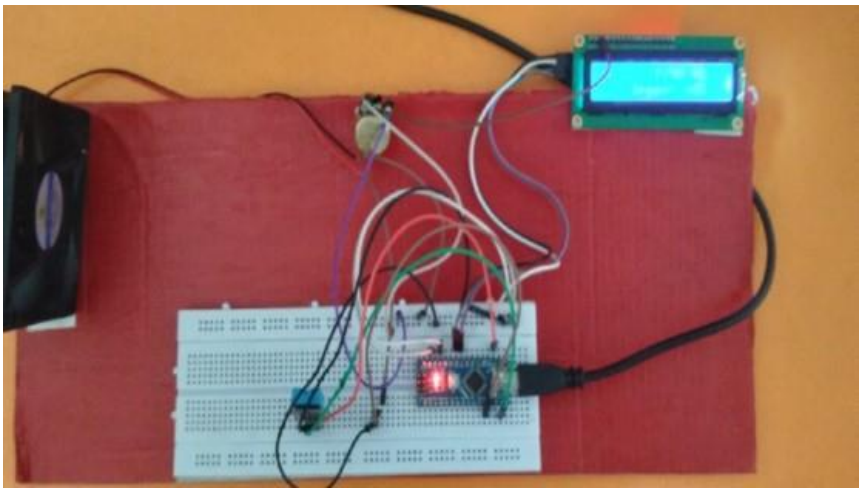

Fig5.2.Running model according to the surrounding temperature.

VI. CONCLUSION

In conclusion, the development of an temperature based automatic fan speed controller using Arduino offers an efficient and user-friendly solution for optimizing energy consumption and maintaining optimal thermal conditions. This project harnesses the capabilities of Arduino to dynamically adjust fan speeds based on real-time temperature readings, ensuring a balance between effective cooling and power efficiency. By integrating this technology, users can enjoy a seamlessly controlled environment, reducing the need for manual intervention while enhancing the overall performance and longevity of electronic devices. The automatic fan speed controller stands as a testament to the practical applications of Arduino in enhancing everyday technologies for greater convenience and sustainability.

Furthermore, the versatility of the Arduino platform allows for customization and expansion of the system. Users can easily modify parameters or incorporate additional sensors, adapting the controller to various environments and applications. This flexibility underscores the adaptability of Arduino-based solutions, showcasing their potential for innovation beyond the initial project scope.

In conclusion, the automatic fan speed controller stands as a testament to the practicality and adaptability of Arduino in enhancing our daily lives. Through its seamless integration with temperature-sensing technology, this project not only optimizes the performance of electronic devices but also serves as a stepping stone towards a more intelligent and energy-conscious future.

REFERENCES

[1]. Kunal Singh, Moloy Dhar, Pritam Roy, ”Automatic fan speed control system using Arduino”, International Journal of Novel Research and Development.

[2]. Mustafa Saad, Hossam Abdoalgader, and Muammer Mohamed, “Automatic Fan Speed Control System Using Microcontroller”.

[3]. Vaibhav Bhatia & Gavish Bhatia “ Room Temperature based fan speed control system using PWM techniques”, International journal of computer applications (0975-8887)volume 81-No5, November 2013.

[4]. Ghana Shyam Soren, Ram Ashish Gupta, “ Temperature controlled DC fan using Microcontroller”, National institute of technology- Rourkela.

[5]. K. Singh, M. Dhar, P. Roy, Automatic fan speed control system using Arduino, ISSN: 2456-4184 International Journal of Novel Research and Development(IJNRD)4 April 2017.

[6]. V. Bhatia, G. Bhatia, Room Temperature based Fan Speed Control System using Pulse Width Modulation Technique, International Journal of Computer Applications (0975 – 8887) Volume 81 – No5, November2013.