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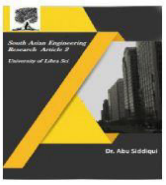

IOT TEMPERATURE BASED FAN SPEED CONTROL & MONITORING SYSTEM

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ABSTRACT

In this project, we will make Temperature Based Fan Speed Control & Monitoring System using Node MCU & observe the data on IoT App Blynk. The fan speed increases based on the increase in temperature. The Blynk App will show the current temperature & Fan speed in percentage. Using the Blynk, we can also set the threshold value at what temperature the fan should turn ON. To sense the room temperature, we will use a DS18B20 Sensor Temperature Sensor. For the fan part, a 12V fan is perfect for this application as it is easy to control the speed with the PWM signal. The 16×2 LCD Display will display the instantaneous temperature and fan speed as well.

This project is to develop an IoT-based smart fan speed control and monitoring system that adjusts the fan speed automatically based on temperature variations. This system improves energy efficiency, reduces manual intervention, and ensures optimal cooling. This project aims to provide a cost effective, efficient, and smart cooling solution that can be used in homes, offices, industries, and server rooms to maintain optimal temperature conditions.

INTRODUCTION

In today's world, automation and smart control systems have become essential for improving efficiency and energy conservation. Traditional cooling systems, however, operate at a fixed speed or require manual adjustments, leading to unnecessary power consumption. This not only increases energy costs but also reduces the lifespan of the cooling system.

To address this limitation, this project, "IoT Temperature-Based Fan Speed Control & Monitoring System," has been developed to regulate fan speed automatically based on real-time temperature data. Leveraging the power of IoT technology, this innovative system monitors temperature fluctuations and dynamically adjusts fan speed to ensure optimal cooling while minimizing energy waste.

The system consists of temperature sensors and a fan driver, all integrated with IoT technology to enable real-time monitoring and control. By implementing this system, users can significantly reduce energy consumption, lower their energy bills, and contribute to a more sustainable future. Additionally, IoT integration allows users to remotely monitor and control the system via a mobile app or web dashboard, providing real-time insights into temperature fluctuations and fan performance. Alerts and notifications can be sent if the temperature exceeds a critical threshold, enabling proactive cooling management.

This smart automation not only enhances user convenience and comfort but also significantly contributes to energy efficiency, making it ideal for smart homes, industrial cooling, and data centre applications.

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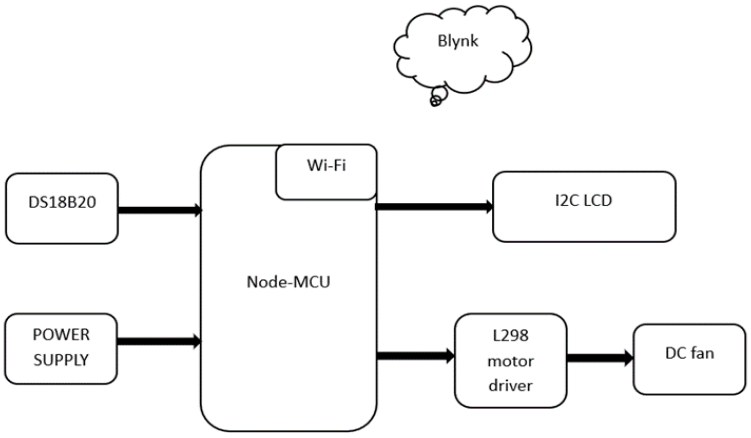

Figure.1 Block Diagram

LITERATURE SURVEY

- Agarwal & Mishra (2019) discussed an IoT-based smart fan system that uses DHT11 temperature sensors with a microcontroller to dynamically adjust fan speed based on ambient temperature. The study highlighted the advantages of real-time monitoring through cloud platforms like Blynk and ThingSpeak. Similarly, Kumar et al. (2020) introduced an automated cooling system using Arduino and an ESP8266 module, where fan speed is controlled via PWM (Pulse Width Modulation) techniques. Their research demonstrated how IoT connectivity allows users to control and monitor temperature changes remotely.
- Other researchers focused on machine learning integration for predictive control. Sharma & Patel (2021) implemented an AI-powered fan speed controller that learns user preferences and environmental conditions to optimize power consumption. The system utilized MQTT protocols for efficient communication and a mobile application for real-time feedback. In addition, Texas Instruments (2022) documented the use of microcontrollers with PWM-based motor drivers to achieve seamless temperature regulation in HVAC (Heating, Ventilation, and Air Conditioning) applications.
- Furthermore, IoT-enabled fan speed controllers have been widely studied in industrial automation. A study by Jadhav & Ranjan (2023) emphasized the role of IoT in thermal management for manufacturing units, where automated fans regulate machinery temperatures, preventing overheating and enhancing equipment longevity.
- These studies collectively illustrate the potential of IoT-based fan speed control systems to improve energy efficiency, reduce manual intervention, and enable real-time monitoring and remote accessibility. Future advancements may incorporate edge computing and AI-driven analytics to further refine automated cooling solutions.

PROPOSED SYSTEM

he proposed IoT-based Temperature-Based Fan Speed Control & Monitoring System aims to automate fan speed regulation based on real-time temperature readings. This system integrates NodeMCU ESP8266, a DS18B20 temperature sensor, and a 12V fan controlled via PWM signals. The Blynk IoT platform is used for remote monitoring, allowing users to view temperature readings and fan speed percentages. Additionally, users can set threshold values through the Blynk app to determine when the fan should activate, enhancing system

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flexibility and efficiency. The 16×2 LCD display provides real-time updates on temperature and fan speed, ensuring transparency in operation.

This project focuses on energy efficiency, automation, and remote accessibility. The smart fan system dynamically adjusts its speed according to the surrounding temperature, reducing manual effort and ensuring optimal cooling. By leveraging IoT and cloud-based monitoring, users can track temperature variations remotely and make informed decisions to enhance comfort and reduce energy consumption. The system can be deployed in homes, offices, industries, and server rooms to maintain optimal temperature conditions, offering a cost-effective and efficient cooling solution.

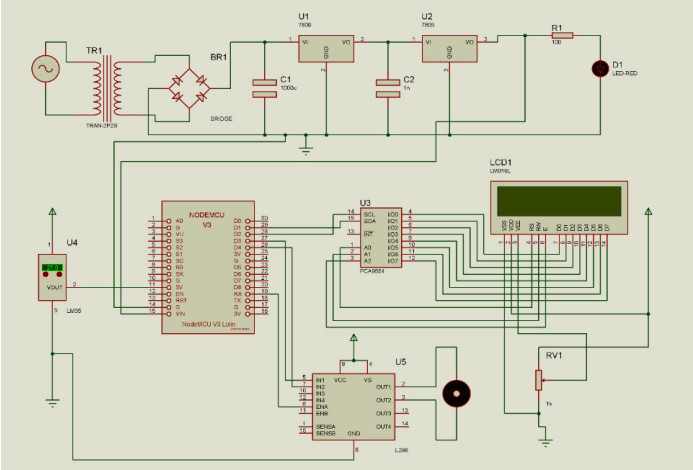

Figure.2 Schematic Diagram

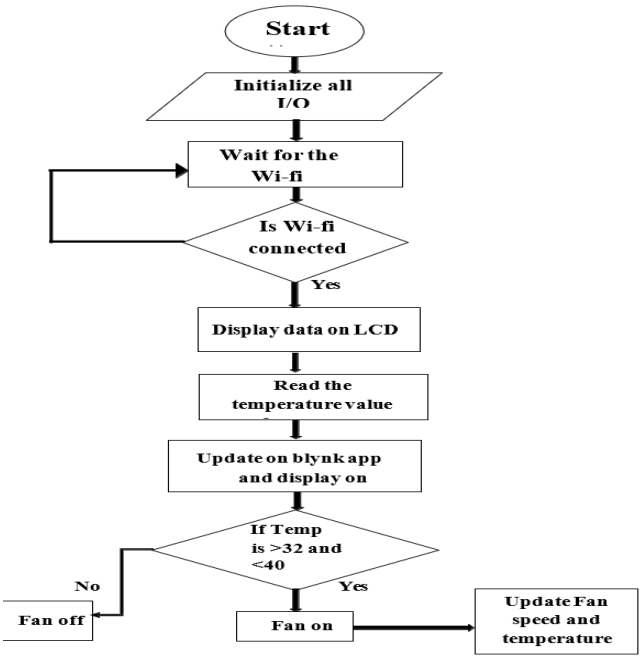

Figure.3 Flow Chart

RESULTS

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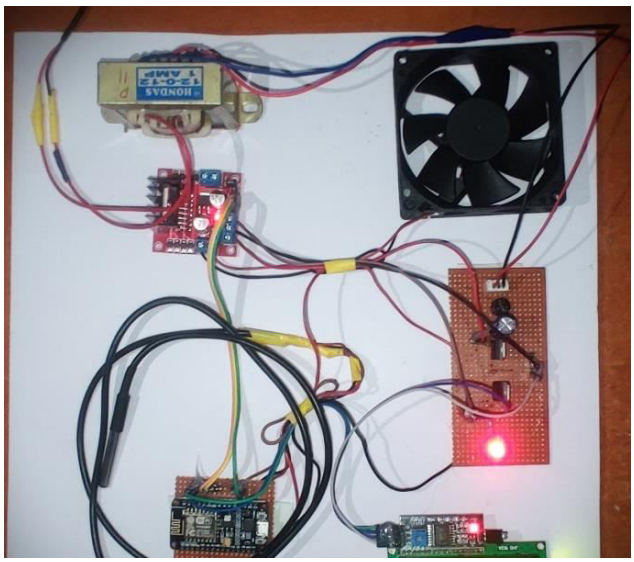

Figure.4 Working Circuit

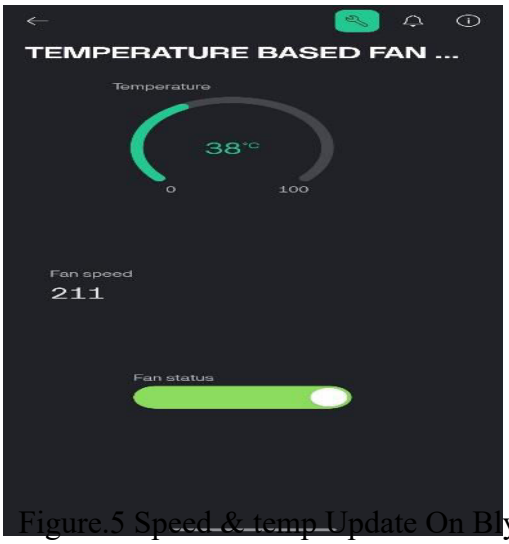

Figure.5 Speed & temp Update On Blynk

- The DSB1820 Temperature sensor continuously measures the ambient temperature.
- The sensor sends analog temperature data to the microcontroller.
- The microcontroller reads the temperature and adjusts the fan speed using PWM (Pulse Width Modulation).
- For DC Fan, PWM controls voltage to regulate speed.
- For AC Fan, a relay module switches between different speed settings.

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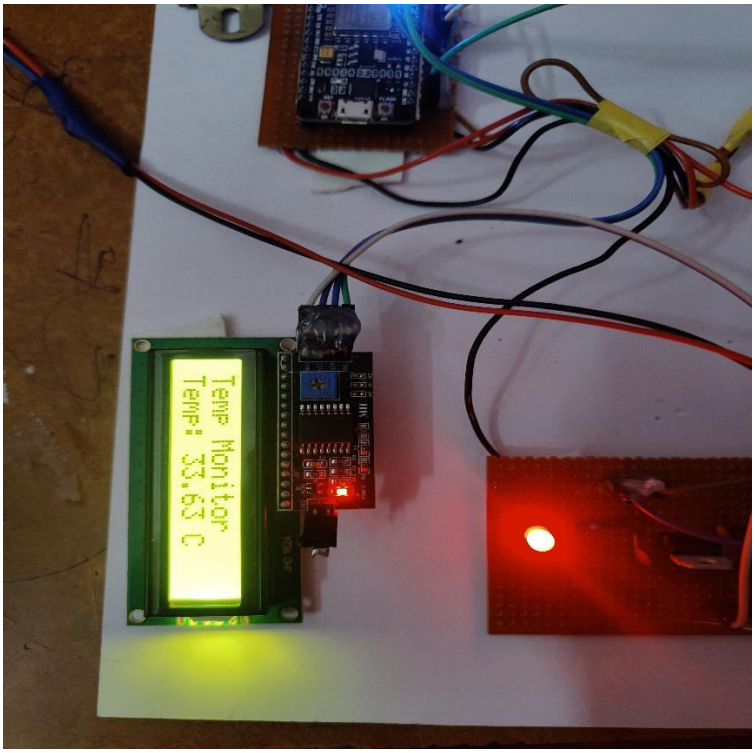

Figure.6 Displaying the Temp On LCD

Temperature (°C)	Fan Speed
< 32°C	OFF
32-40°C	Low Speed (30%)
40-45°C	Medium Speed (60%)
> 45°C	High Speed (100%)

ADVANTAGES

- **Energy Efficiency –** Automatically adjusts fan speed based on temperature, reducing unnecessary power consumption.
- **Automation & Smart Control –** Eliminates manual operation by intelligently regulating fan speed.
- **Remote Monitoring & Control –** Users can monitor and set threshold values through the Blynk IoT app.
- **Enhanced Cooling Efficiency** – Ensures optimal temperature regulation in various environments.
- **Cost-Effective Solution –** Reduces energy bills and maintenance costs compared to traditional cooling systems.

- **User-Friendly Interface –** Displays real-time temperature and fan speed on an LCD for easy monitoring.
- **Scalability –** Can be expanded to integrate with multiple fans and sensors for larger applications.
- **Eco-Friendly –** Minimizes energy wastage, promoting a sustainable and green solution.
- **Customizable Thresholds –** Allows users to set and adjust temperature limits for fan activation.
- **Versatile Applications –** Suitable for homes, offices, industries, and server rooms for efficient cooling.

CONCLUSION

The IoT Temperature-Based Fan Speed Control & Monitoring System is an efficient and smart automation project that helps regulate fan speed based on real-time temperature readings. By leveraging IoT technology, it enables users to remotely monitor and control the system through a mobile or web dashboard. This not only reduces energy consumption but also provides comfort and convenience in homes, offices, and industrial environments.

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