TEMPERATURE BASED AUTOMATIC FAN SPEED CONTROL USING IOT

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ABSTRACT

Temperature-based fan speed controllers are used in various applications such as electronic devices, home automation systems, and industrial processes. In this research, an IoT-based temperature-based fan speed controller is designed and implemented. The system consists of a temperature sensor, a microcontroller, and a Wi-Fi module. The temperature sensor senses the temperature of the environment, and the microcontroller processes the temperature data and controls the speed of the fan based on the temperature readings. The Wi-Fi module is used to connect the system to the internet and control the fan speed remotely using a mobile application. The proposed system provides energy-efficient operation by controlling the fan speed according to the temperature of the environment. The experimental results show that the system can effectively control the fan speed based on the temperature readings.

This project introduces an IoT-based temperature monitoring and control system designed to regulate ambient temperature efficiently. Utilizing an ESP32 microcontroller, DS18B20 temperature sensor, and BC 2N2222 transistor, the system accurately measures temperature and adjusts a 12V DC fan to maintain desired levels. With IoT connectivity, users can remotely monitor and control the system via web or mobile interfaces. The project aims to enhance energy efficiency and comfort in various environments while enabling real-time data insights. Through rigorous testing and evaluation, the system demonstrates its effectiveness in temperature regulation and remote accessibility.

Keywords:- Temperature-Based Fan Speed Controller, Iot, Temperature Sensor, Microcontroller, Wi-Fi Module.

1. INTRODUCTION

Today's rapidly evolving technological landscape, the Internet of Things (IoT) has emerged as In a transformative force, enabling the connection and interaction of everyday objects with the digital world. One of the critical applications of IoT technology is in the realm of environmental monitoring and control. Temperature regulation plays a vital role in various domains, including homes, offices, and industrial settings, impacting energy efficiency, comfort, and productivity.

This project introduces an IoT-based temperature monitoring and control system designed to address the need for efficient temperature management. Leveraging the capabilities of the ESP32 microcontroller, DS18B20 temperature sensor, and BC 2N2222 transistor, the system offers precise temperature measurement and automated control of a 12V DC fan. By integrating IoT connectivity, users gain the ability to monitor and adjust temperature settings remotely via web or mobile interfaces.

Through this project, we aim to demonstrate the practical application of IoT technology in enhancing temperature regulation while providing insights into real-time environmental data. The following sections will delve into the system's architecture, design considerations, implementation details, and evaluation results, showcasing its effectiveness and potential impact across various environments.

2. WORKING

2.1 Temperature Sensing with DS18B20 Sensor:

- The DS18B20 temperature sensor utilizes a digital temperature sensor chip that communicates over a OneWire protocol. It is connected to the ESP32 microcontroller through the GPIO pins.
- The sensor measures the ambient temperature and converts it into a digital signal. It then sends this digital signal to the microcontroller.

2.2 Microcontroller Data Processing:

- The ESP32 microcontroller receives the digital temperature data from the DS18B20 sensor. It then processes this data to determine if the current temperature exceeds predefined thresholds for heating or cooling.
- The microcontroller compares the current temperature reading with the desired temperature thresholds stored in its memory.

2.3 PWM Generation for Transistor Control:

- Based on the temperature comparison, the microcontroller decides whether to activate or deactivate the cooling function of the system.
- If the temperature exceeds the upper threshold, indicating a need for cooling, the microcontroller generates PWM (Pulse Width Modulation) signals.
- PWM signals are a series of pulses with varying widths. By adjusting the width of these pulses, the microcontroller controls the speed of the 12V DC fan connected to the BC 2N2222 transistor.

2.4 Fan Speed Control:

- The BC 2N2222 transistor controls the power supply to the 12V DC fan. When the PWM signal is applied to the transistor's base, it regulates the amount of current flowing through the fan, thereby controlling its speed.
- As the temperature decreases and reaches the desired threshold, the microcontroller adjusts the PWM signal accordingly to reduce the fan speed or turn it off completely.

2.5 Continuous Monitoring and Adjustment:

- The system continuously monitors the temperature and adjusts the PWM signals sent to the transistor based on real-time temperature readings.
- This feedback loop ensures that the temperature remains within the desired range, providing efficient temperature regulation in the environment.

2.6 Data Transmission to Blynk IoT Application:

- The microcontroller utilizes the Blynk IoT platform to transmit temperature data to a Blynk mobile or web application.
- It connects to the internet using Wi-Fi connectivity provided by the ESP32.
- Through the Blynk library and API, the microcontroller sends temperature data to the Blynk server, where it is accessible to the user in real-time.

2.7 Integration with 16x2 LCD Display:

- In addition to transmitting data to the Blynk application, the microcontroller displays temperature information on a 16x2 LCD display.
- The microcontroller utilizes GPIO pins to interface with the LCD display, sending commands and data to display the current temperature readings.
- The LCD display provides a local interface for users to view temperature information without the need for accessing the Blynk application.

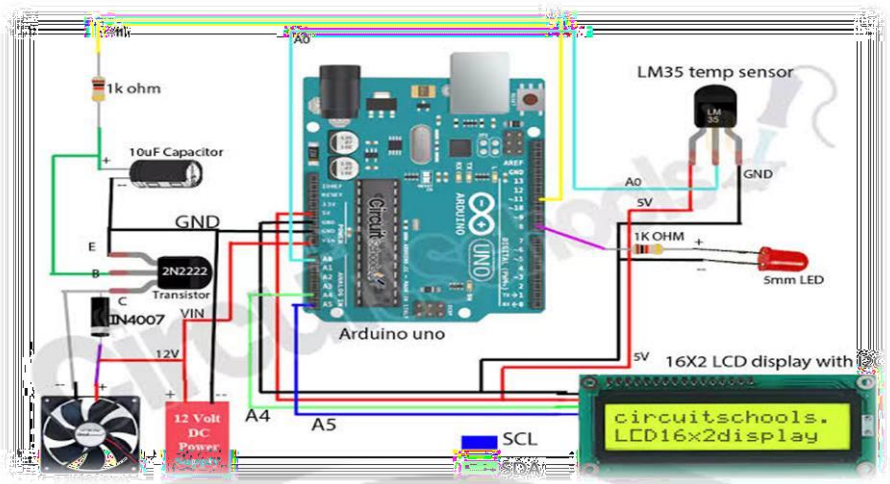

Fig- 1: SCHEMATIC DIAGRAM OF FAN SPEED CONTROL

3. CONCLUSIONS

In conclusion, the IoT-based temperature-controlled monitoring system presented in this project offers a sophisticated yet accessible solution for managing ambient temperature levels in various environments. By leveraging the capabilities of the ESP32 microcontroller, DS18B20 temperature sensor, and Blynk IoT platform, the system provides users with real-time monitoring and control capabilities, enhancing energy efficiency, comfort, and convenience.

Throughout the project, we have demonstrated the effectiveness of the system in accurately measuring temperature, dynamically adjusting fan speed based on predefined thresholds, and enabling remote monitoring and control via the Blynk application. The integration of PWM control for fan speed regulation ensures precise temperature control while minimizing energy consumption.

4. ACKNOWLEDGEMENT

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