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IoT Based AC Fan Speed Control using Smart Phone

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Abstract: *This project aims to create an IoT-based AC fan speed control system using a smartphone with NodeMCU. The system uses a solid-state relay and a triac to regulate the power delivered to the fan, and the speed of the fan is controlled using PWM. By connecting the fan to the internet via the NodeMCU board, users can control the fan speed wirelessly using a mobile app. The project is a practical example of how IoT can be used to create smart and efficient solutions for everyday problems, providing users with convenience and energy savings. This abstract summarizes the key objectives and outcomes of the project and provides a brief overview of the system's design and functionality.*

Keywords: Smartphone, Node MCU, AC fan

I. INTRODUCTION

IoT (Internet of Things) based AC (Alternating Current) fan speed control using a smartphone with NodeMCU is a project that allows users to remotely control the speed of an AC fan using their smartphone. The project uses the NodeMCU development board, which is based on theESP8266 WiFi module, to connect the fan to the internet and provide wireless control capabilities.

The system allows users to connect their smartphones to the NodeMCU through a WiFi network and control the fan speed using a mobile app. The app can be customized to provide different speed options and even turn the fan on and off.The project involves using a solid-state relay (SSR) to switch the power on and off to the fan,and a triac to regulate the amount of power delivered to the fan. The speed of the fan is controlled by varying the power delivered to the fan using pulse-width modulation (PWM).

This project is an excellent example of how IoT can be used to create smart and efficient solutions for everyday problems. With the ability to remotely control the fan speed using a smartphone, users can easily and conveniently adjust the fan speed to their preferences without having to physically interact with the fan. Additionally, this project can be extended to control other appliances in the home, such as lights and air conditioners, providing even more convenience and energy savings.

II. METHODOLOGY

The methodology for developing the IoT-based AC fan speed control system using a smartphone with NodeMCU can be divided into several steps:

1. Hardware selection and assembly: The first step is to select and assemble the required hardware components, including the NodeMCU board, SSR, triac, and other necessary components.
2. Circuit design and testing: The next step is to design the circuit for the system and test its functionality. This involves creating the necessary connections between the hardware components and testing the circuit using a multimeter or oscilloscope.
3. Software development: Once the hardware is tested and functional, the next step is to develop the software for the system. This includes programming the NodeMCU board to connect to a WiFi network and receive commands from a mobile app to control the fan speed.

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4. Mobile app development: The mobile app is developed to allow users to control the fan speed wirelessly. The app is designed to communicate with the NodeMCU board via WiFi and send speed control commands to the system.
5. Integration and testing: After the software and mobile app are developed, the next step is to integrate them with the hardware and test the system's overall functionality.
6. Deployment and user testing: Once the system is fully functional, it can be deployed foruse and tested by users to determine its effectiveness, usability, and any necessary improvements. This methodology involves a systematic approach to developing the IoT-based AC fan speed control system using a smartphone with NodeMCU. By following this methodology, can ensure that the system is reliable, efficient, and user-friendly.

III. HARDWARE USED

The hardware used in an IoT-based AC fan speed control system using a smartphone with NodeMCU typically includes:

1.NodeMCU Development Board: This board is based on the ESP8266 WiFi module and provides the wireless connectivity required to connect the fan to the internet and allow for remote control

Fig 3.1:Node MCU ESP8266

2. Solid-State Relay (SSR): An SSR is used to switch the power on and off to the fan.

Fig 3.2: Solid-State Relay

3. AC Fan: The AC fan is the appliance that the system controls.

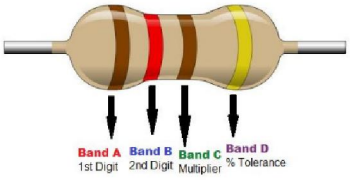

Fig 3.4.1: Resistors

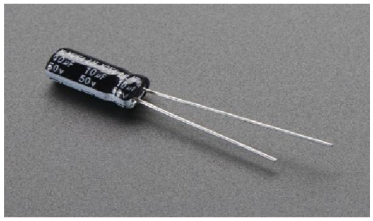

Fig 3.4.2: Capacitor

4. Resistors, Capacitors, and Other Electronic Components: These components are used to create the necessary circuitry for the system.

5. Power Supply: A power supply is needed to provide power to the NodeMCU board, SSR, and triac.

The selection of hardware components will depend on the specific requirements of the project and the availability of the components. It's essential to select components that are compatible with each other and can perform the necessary functions reliably and efficiently. Additionally, safety should be a top priority when working with high-voltage circuits, so it's important to ensure that all components are installed correctly and that proper safety procedures arefollowed during assembly and testing.

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IV. RESULT AND DISCUSSION

The result analysis of an AC fan speed controlling system is typically focused on evaluating the system's performance in maintaining the desired environment, such as temperature and airflow, while also ensuring efficient and effective operation of the AC fan.

Here are some key metrics that may be used to analyse the results of an AC fan speed controlling system:

1. Temperature Control: The system's ability to maintain the desired temperature range can be evaluated by comparing the actual temperature readings to the set temperature range. Any deviations from the desired temperature range may indicate a need for adjustments to the control algorithm or fan speed settings.
2. Fan Speed Control: The system's ability to maintain the desired fan speed can be evaluated by comparing the actual fan speed to the set fan speed. Any deviations from the desired fan speed may indicate a need for adjustments to the fan driver or control algorithm.
3. Testing: After the software and mobile app are developed, the next step is to integrate them with the hardware and test the system's overall functionality. Once the system is functional, it can be deployed for use and tested by users to determine its fully effectiveness, usability, and any necessary improvements.
4. Power Consumption: The power consumption of the system can be measured to evaluate its efficiency. A well-designed AC fan speed controlling system should consume only the minimum amount of power required to maintain the desired environment
5. Noise Levels: The noise levels generated by the AC fan can be measured and evaluated against any specific requirements or regulations.
6. System Stability: The system's stability and reliability can be evaluated by monitoring its performance over time and detecting any anomalies or issues that may arise. Overall, the result analysis of an AC fan speed controlling system is focused on evaluating the system's ability to maintain the desired environment while also ensuring efficient and effective operation of the AC fan. Any deviations or issues should be identified and addressed to ensure optimal performance of the system.,

V. CONCLUSION

In conclusion, an IoT-based AC fan speed control system using a smartphone with NodeMCU isa modern and convenient solution for controlling the speed of AC fans in homes, offices, and other settings. The system offers several advantages, such as remote control, energy efficiency, customizability, ease of use, and scalability.

However, the system also has some disadvantages, including internet connectivity, technical expertise, security risks, compatibility issues, and cost. These factors should be considered when deciding whether to use the system.

Overall, an IoT-based AC fan speed control system using a smartphone with NodeMCU can be an excellent solution for individuals looking for a convenient, energy-efficient, and customizable way to control the speed of AC fans. With proper planning, implementation, and maintenance, the system can provide years of reliable service and comfort.

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