

Smart Fan Control System: IoT-Enabled Speed Regulation for Commercial Fans

Darshil Mavadiya (22BEC508)

Electronics & Communication Engineering
Nirma University, Ahmedabad
Ahmedabad, India

Anant Kothivar (22BEC506)

Electronics & Communication Engineering
Nirma University, Ahmedabad
Ahmedabad, India

Kalaria Kishan (22BEC505)

Electronics & Communication Engineering
Nirma University, Ahmedabad
Ahmedabad, India

Abstract—This paper explains an efficient speed control method of an electric fan module using Smart Android phone. ESP32 circuits are used in this process to achieve the objective of this paper. internet connection is used as a communication protocol between fan, Espino board and smart phone. The goal is to develop an existing fan into a smart fan, thereby the user can regulate the fan speed from his or her foot step. The final prototype fan model significantly improves ease of use for senior citizens and disabled persons. The proposed method is simple and provides room for further improvement.

KeyWords : *Phase angle control, Espino controller, Zero Crossing Detection, Triac control.*

I. INTRODUCTION

In an era dominated by technological advancements, the integration of Internet of Things (IoT) has revolutionized the way we interact with everyday devices. Among these innovations, the IoT-based fan speed control regulator stands out as a remarkable fusion of convenience, efficiency, and sustainability.

Traditionally, regulating the speed of a fan required manual adjustment, often leading to energy wastage and inconvenience. However, with the advent of IoT technology, this process has been streamlined and optimized to meet the demands of modern living.

Imagine a scenario where you can effortlessly control the speed of your fan from anywhere, at any time, using just your smartphone or voice commands. This level of flexibility not only enhances user experience but also promotes energy conservation by allowing precise control over power consumption. The IoT-based fan speed control regulator operates on the principle of connectivity, enabling seamless communication between the user and the device. Through the utilization of sensors, actuators, and Wi-Fi connectivity, users can remotely adjust fan speed settings with ease, ensuring optimal comfort in any environment.

Moreover, the integration of data analytics and machine learning algorithms further enhances the functionality of the system. By analyzing user preferences and environmental conditions, the regulator can intelligently adjust fan speed settings to maximize comfort while minimizing energy consumption. In addition to its practical benefits, the IoT-based fan speed control regulator also serves as a testament to the potential of IoT technology to transform mundane household appliances

into smart, interconnected devices. Its implementation not only enhances convenience but also paves the way for a more sustainable future by promoting efficient energy usage.

In this comprehensive guide, we will delve deeper into the workings of the IoT-based fan speed control regulator, exploring its components, functionalities, and potential applications. From its inception to its integration into real-world scenarios, we will uncover the myriad benefits and possibilities that this innovative technology has to offer. Join us on this journey as we explore the intersection of IoT and fan control, and discover how this groundbreaking solution is reshaping the way we interact with our surroundings.

II. PROBLEM STATEMENT

The main problem with existing conventional fans like ceiling fan, table fans, pedal fans, etc. is that the speed can only be controlled stepwise. The user also has to control it manually each time whenever the fan speed needs to be changed; which can be a serious issue for senior or disabled persons. In addition, the power consumption in these types of conventional fans is high given the amount of air flow produced. Our proposed method can solve this problem effectively and provide a IOT based fan speed control regulator in a much efficient way. The final prototype fan can increase user's comfort level as it can be controlled remotely with good Internet connection.

III. TECHNICAL APPROACH

Nowadays, the concepts of Internet of Things play an integral role in finding the solution to different problems. In the same way, our technical approach is to control the fan motor by using a Smart Phone with manually.

The first block is the ESP32. The ESP32 connects me to the Internet and gives me the signal for the fan speed control. ESP32 gives the signal to the feedback mechanism, and then the feedback mechanism checks if the ESP32 is on or off. When ESP32 is on, the next signal is given to the optocoupler. If the ESP32 is turned off, all circuits will now operate manually, which means that any control can now function as a fan regulator. If ESP32 is on, then how will the signal come in block diagram? First, the ESP32 is a give-signal-to-feedback system. And at the same time, any person would manually change the speed, so the fan feedback mechanism would send

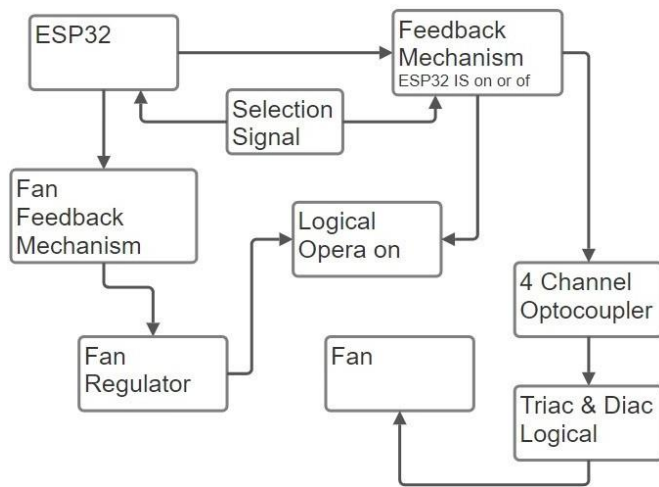


Fig. 1: Block diagram illustrating the components and functionality of the IoT-based fan speed control regulator.

the data up to the ESP32. than the ESP32, give the data to the feedback mechanism, optocoupler, triac, and diac logical than the fan. this way to signal communication. If ESP32 is off, then how will the signal come in block diagram? When ESP32 is off, you can't control anything from your mobile app. So now we simply control the fan speed with the fan regulator. Now this is how the signal will flow. First, we will change the speed in the manual fan regulator, then this signal will go to the logical operation and then to the fan mechanism.

The signal will come to the optocoupler, then the signal will come to the triac and DAC, and then the output will get to the fan. This is how our system works.

IV. CONCLUSION

To sum up, our home automation project that makes use of an IoT device—a fan regulator, to be exact—demonstrates how easily IoT concepts can be incorporated with useful Python programming. By allowing control via an Android device as well as manual operation, we have not only made things more convenient but also shown how IoT can improve daily chores. This project demonstrates the ability of innovation to create more intelligent and networked living spaces, opening the door for future developments in IoT technology.

