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# Wind Air Control

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**Abstract**

**The Internet of Things (IoT) continues to transform conventional home environments into intelligent, interconnected systems, offering convenience, efficiency, and enhanced user control. This project presents an IoT-based smart fan control system that leverages the ESP32S microcontroller and the Blynk mobile application to enable real-time, wireless control of a fan's power and speed. The ESP32S serves as the core processing unit, facilitating seamless communication between hardware and cloud-based services via Wi-Fi. The system architecture aligns with widely adopted IoT models** [1]**;** [2] **and incorporates mobile-based automation principles as highlighted by** [3] [4]**Additionally, it draws from** [5]**foundational vision of IoT and contemporary insights into scalable smart home solutions** [6] [7]**Through the integration of modern software interfaces like the Blynk app and robust hardware platforms, this project offers a cost effective, user-friendly approach to smart appliance control, paving the way for more advanced applications in home automation and energy management.**

**Keywords: Internet of Things (IoT), Smart Home Automation, ESP32S, Blynk App, Fan Control System Wireless Communication, Mobile App-based Control**

## INTRODUCTION

The Internet of Things (IoT) has revolutionized modern living by enabling seamless connectivity between devices and users, making home automation more accessible and efficient. This project focuses on developing a smart fan control system using the ESP32S microcontroller and the Blynk mobile application. Through Wi-Fi connectivity, users can remotely operate the fan—turning it on/off and adjusting its speed—via a smartphone. This approach aligns [5]original vision of the IoT as a network of interconnected smart objects and builds on practical applications of home automation as discussed by [4]. The system aims to provide a cost-effective, real- time solution for enhancing comfort and energy efficiency in smart homes.

## PROBLEM STATEMENT

Helping someone else in the house who can't easily reach the fan switch or saving electricity by shutting off fans when not in use are the major issues we're resolving for elderly individuals and disabled persons who have trouble reaching the switch.

**METHODOLOGY**

The steps below are how we plan to tackle this issue:

We started by determining the system's requirements, which included being able to connect to the internet, manage a fan, be user- friendly, and maintain stability over time. Because it costs approximately $8, has built-in WiFi, and has enough computing power for our needs, we decided to use the ESP32 microcontroller.

We decided to utilize a 5V relay module ($3) that can safely transfer household electricity to control the fan. A digital output pin (GPIO4) on the relay connects to the ESP32. Additionally, we display connection status using the ESP32's integrated LED on GPIO2.

Because the Arduino programming environment is easy to learn and has solid support for both the ESP32 and Blynk, it is used in the software approach. To keep things orderly, we divided the code into distinct routines for the fan control, WiFi connection, and status updates.

We decided to use the Blynk app for the user interface since it is compatible with both iOS and android smartphones and doesn't require any programming knowledge. We included a text display to indicate the current condition and a straightforward button to turn the fan on and off in the app We tested the relay control, the Blynk communication, the ESP32-WiFi connection, and finally the entire system in an incremental manner. Early in the development process, issues were found and fixed thanks to this methodical approach.

- Blynk app on a smartphone: Function: The Blynk smartphone app is used to control the fan here. Relationship: uses WiFi to wirelessly communicate with the ESP32 (as indicated by the blue wavy arrow).

How it operates: When you push the switch in the Blynk app, a command is sent to the Blynk cloud server via the internet, and the server then relays the command to your ESP32.

- Connection for Control (Green Arrow):

ESP32 GPIO4 → Pin for the relay IN This activates the relay by sending the

| | | |
|---|---|---|
| HIGH/LOW | digital | signal. |
| Power | connections | : |
| ESP32 5V | → VCC | Relay |
| Relay GND | → ESP32 | GND |

- These supply electricity to the control circuit of the relay module. Connections between Batteries and Relays

Connection to the Power Source (Yellow Arrow):

Positive (+) battery Relay COM (Common) Terminal → Terminal This supplies the power that the relay will switch.

- Connect to Fan Connections: Power Connection Switch (Orange Arrow):

The fan positive (+) wire is connected to the Relay NO (usually open) terminal.

Relay connects COM to NO when it is activated, enabling current to flow to the fan.

- Fan Connections to Batteries: (Implied, not shown explicitly) Return Path Connection: Battery Negative (-) Terminal → Fan Negative (-) Wire

This completes the circuit and gives the current battery to ESP32 connections a return path.
Connection to the Power Supply: ESP32 VIN pin to battery (or via USB) Usually, the ESP32 converts the incoming voltage to 3.3V using its internal voltage regulator. Note: The ESP32 needs to be powered by a dedicated voltage regulator or USB for dependable operation.

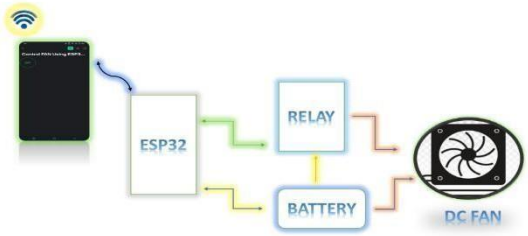


**Figure I-Block diagram**

**RESULT**
**ESP32**

The **ESP32** is a low-cost, high-performance microcontroller developed by Espress if Systems, widely used in IoT applications. It features a dual-core processor, built-in **Wi-Fi** and **Bluetooth**, and multiple GPIO pins that support digital I/O, PWM, ADC, and communication protocols like UART, SPI, and I2C. Its built-in wireless capabilities eliminate the need for additional modules, making it ideal for smart home projects In this fan control project, the **ESP32S** acts as the main controller, connecting to the internet and communicating with the **Blynk mobile app**. It allows users to remotely switch the fan on/off and control its speed using Wi-Fi. The ESP32 generates PWM signals to adjust speed through a motor driver, offering a real time, efficient, and scalable solution for home automation ‘

*Figure III-OFF State*

**Figure II-ESP32 Module**

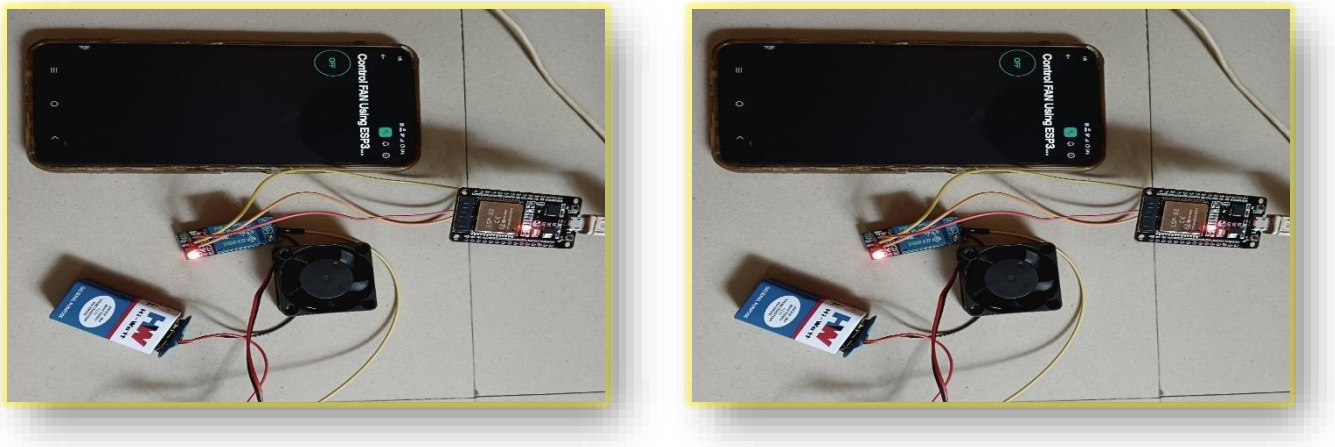

**Figure IV-ON**

## CONCLUSION

Using ESP32 and Blynk, we were able to create a remote-controlled fan system that enables anyone to use a smartphone to operate their fan from any location. Our testing indicates that we were successful in achieving our goals of making something straightforward, reasonably priced, and dependable.

There are numerous advantages to the system: Remote control from any location with an internet connection Simple one-button operation; automatic reconnection in the event that WiFi breaks; real-time status updates; low power consumption; and a component cost of less than $20 overall The experiment shows how commonplace appliances can become smarter and easier to operate with the help of the Internet of Things. It demonstrates that practical home automation is possible even with little financial resources and technological expertise.

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