

# GuardAnywhere: Remote Secure Door System

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## Introduction

In an increasingly connected world, the need for secure and efficient access control systems has become paramount. The IoT-Based Secure Door Access System leverages IoT and RFID technology to create a smart door that provides secure, remote-controlled access. This project aims to develop an access control system that uses RFID tags for authentication and integrates with the Blynk app for remote monitoring and control.

## Components

### Hardware

- **RC522 RFID Module:** Reads RFID tags to authenticate access.
- **Active Buzzer:** Provides audio feedback when access is authorized.
- **SG90 Servo Motor:** Controls the physical opening and closing of the door.
- **ESP32:** Serves as the central processing unit, managing all inputs and outputs.
- **Blynk App:** Allows for remote control and real-time notifications.

### Software

- **Blynk App:** Displays the door status and sends notifications.

## System Design

### Access Control

The primary function of the system is to control access through RFID tags:

- **RFID Tag Reading:** The RC522 module reads RFID tags presented to it.
  - **Authorized Access:** If the tag is authorized, the ESP32 triggers the servo motor to open the door and activates the buzzer to indicate successful entry. The Blynk app sends a notification and updates the door status to "open."
  - **Unauthorized Access:** If the tag is not authorized, no action is taken to open the door, and the system remains locked.

## Servo Motor

The SG90 servo motor is responsible for the physical movement of the door:

- **Door Operation:** Upon receiving a signal from the ESP32, the servo motor rotates to open or close the door.

## Blynk App

The Blynk app enhances the user experience by providing:

- **Real-time Notifications:** Users receive notifications when the door is opened.
- **Status Display:** The app shows whether the door is currently open or closed.

## Circuit Design

The hardware components are interconnected as follows:

- The RC522 RFID module is connected to the ESP32 to read RFID tags.
- The active buzzer is connected to the ESP32 to provide audio feedback.
- The SG90 servo motor is connected to the ESP32 to control the door movement.
- The ESP32 communicates with the Blynk app via Wi-Fi.

## Software Development

The system's firmware is written in Arduino IDE and involves:

- **RFID Tag Reading:** Code to read and process RFID tags.
- **Servo Motor Control:** Code to operate the servo motor based on access decisions.
- **Blynk App Integration:** Code to send notifications and update door status.

## Testing and Validation

The system underwent rigorous testing to ensure reliability:

- **RFID Tag Testing:** Verified that authorized tags opened the door and unauthorized tags did not.
- **Buzzer Feedback:** Ensured the buzzer sounded correctly upon authorized access.
- **Servo Motor Operation:** Tested the door's physical movement for smooth operation.
- **Blynk App Integration:** Confirmed that notifications were timely and the status display was accurate.

## **Conclusion**

The IoT-Based Secure Door Access System successfully integrates IoT and RFID technology to provide a secure, efficient, and user-friendly access control solution. By leveraging the Blynk app, the system offers remote management and real-time monitoring, enhancing the overall functionality and convenience.

This project demonstrates the potential of IoT in improving traditional access control systems, paving the way for future innovations in smart security solutions.