



International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

SMART WIRELESS AUTOMATION

Gaurav Hingade¹, Yash Zaware², Dnyabeshwar Shete³

Department of Electronics and Telecommunication
Samarth Polytechnic, Belhe, Pune – 412410, India

ABSTRACT :

This paper presents the proposed design of a Smart Wireless Automation System for controlling electrical loads such as a fan and tube light through a mobile phone while retaining manual wall-switch operation. The proposed system uses a Wi-Fi-enabled controller, relay interface, and mobile control interface. Wireless commands are processed by the controller, which operates the corresponding relay channel. Physical switches are also included for local operation. This draft describes the proposed architecture; hardware details and measured performance must be confirmed against the actual prototype before submission.

Keywords: Smart wireless automation, home automation, Wi-Fi, microcontroller, relay module, mobile control, manual switch.

1. INTRODUCTION

Automation is increasingly used to make the control of electrical loads more convenient. In a conventional room, a user operates a wall switch to control each light or fan. A wireless automation system can add mobile-phone control while retaining local manual switching. This paper presents the proposed design of a Smart Wireless Automation System intended for a room or classroom. The concept focuses on controlling loads such as a tube light and a fan through a Wi-Fi-enabled controller and relay interface.

2. PROBLEM STATEMENT

Conventional switching requires the user to reach the physical switchboard. This can be inconvenient when a load needs to be controlled from another position or when several loads are involved. The proposed system addresses this issue by combining wireless ON/OFF commands from a mobile phone with physical switch operation.

3. OBJECTIVES

The objectives of the proposed project are: (i) provide wireless control of selected electrical loads; (ii) allow ON/OFF commands from a mobile phone over Wi-Fi; (iii) retain manual operation using physical switches; (iv) provide separate control channels for loads such as a fan and tube light; and (v) develop an educational prototype that can potentially be expanded to six channels after checking controller I/O and relay capacity.

4. PROPOSED SYSTEM

The proposed architecture consists of a Wi-Fi-enabled microcontroller, mobile-phone control interface, relay module, physical switch inputs, regulated low-voltage power supply, and electrical loads. The controller receives a wireless command or detects a physical switch input and then changes the relevant relay output. A controller such as an ESP8266- or ESP32-based board may be considered if it is the hardware selected for the actual prototype. The final component list must match the hardware that is actually built.

5. SYSTEM BLOCK DIAGRAM

Figure 1 shows the functional concept. Mobile commands pass through a Wi-Fi connection to the controller, which operates the relay module. Physical switches provide a local-control path. The precise connection arrangement depends on the selected controller, relay board, and switch interface.

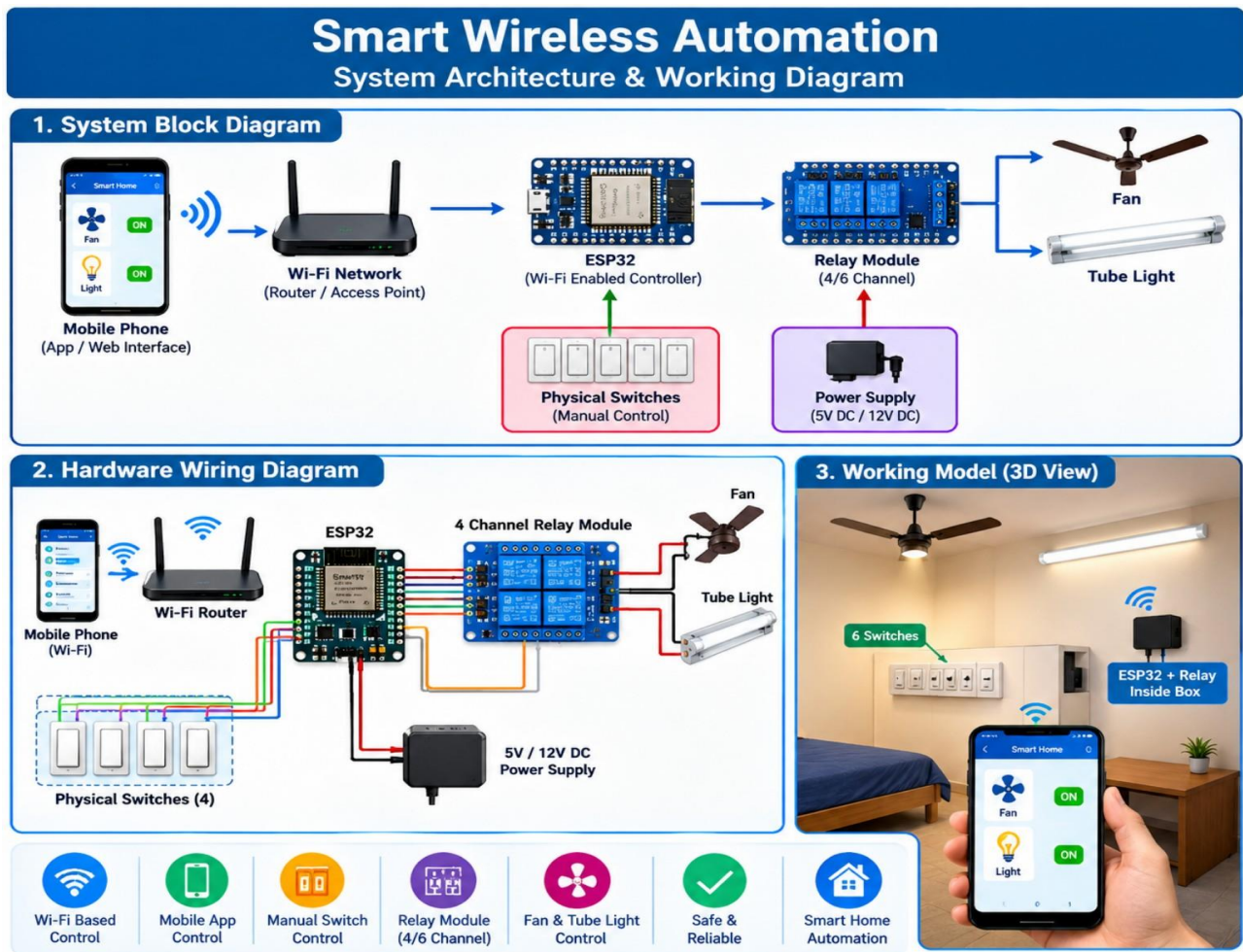
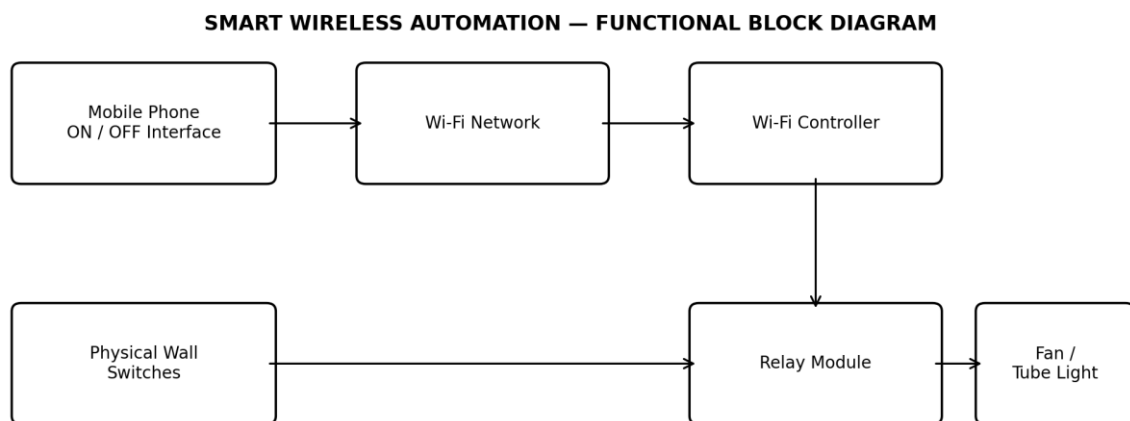


Figure 1. Colour system architecture, hardware wiring, and working model of the proposed Smart Wireless Automation System.



Functional concept only — confirm controller, pinout and wiring against the actual prototype.

Figure 1. Functional block diagram of the proposed system (concept only).

6. HARDWARE REQUIREMENTS

The proposed hardware may include: (1) Wi-Fi-enabled controller; (2) relay module with appropriate channel count and electrical ratings; (3) mobile phone; (4) physical switches or push buttons; (5) regulated low-voltage DC supply; (6) fan and tube light or low-voltage demonstration loads; and (7) insulated wiring, connectors, enclosure, and mounting hardware. Confirm the actual parts and ratings before final submission.

7. SOFTWARE REQUIREMENTS

The software side requires a programming environment compatible with the selected controller, firmware to manage Wi-Fi connection and relay outputs, logic to read the physical switch inputs, and a mobile application or web interface for ON/OFF commands. Depending on the implementation, the controller may join an existing Wi-Fi network or provide a local access point.

8. WORKING PRINCIPLE

First, the controller is powered from a regulated low-voltage supply. It connects to the configured Wi-Fi network or creates a local access point. The user selects a load and presses ON or OFF in the mobile interface. The controller receives the command and changes the corresponding relay output. A physical switch can also request a change in load state. Firmware should coordinate the wireless and manual inputs so that the state remains consistent. Relay contacts switch the load through a suitably rated and isolated interface.

9. DESIGN AND SAFETY CONSIDERATIONS

Controller outputs must not be connected directly to mains loads. Relay ratings, isolation, fusing, enclosure, wire gauge, strain relief, and earthing must be selected for the real load and applicable electrical requirements. Initial testing should use low-voltage demonstration loads. Mains wiring must be installed and checked by a qualified person. Wi-Fi credentials should be protected, and access to the control interface should be restricted.

10. TESTING AND RESULTS

Measured results were not supplied for this draft; therefore, no numerical performance results are claimed. Before submission, test and record: (i) mobile ON/OFF operation for each load; (ii) manual switch operation; (iii) consistency between mobile and manual control; (iv) behaviour after Wi-Fi interruption and reconnection; and (v) repeated switching. Add the actual observations and measured response times in the table below. Do not report expected performance as measured results.

11. ADVANTAGES

The proposed system can provide mobile control of selected loads, retain physical switch operation, offer convenient switching within the supported network, support modular expansion with additional relay channels, and provide practical learning in embedded systems and wireless control.

12. APPLICATIONS

Potential applications include homes, classrooms, laboratories, small offices, educational demonstration boards, and wireless switching of compatible electrical loads.

13. LIMITATIONS

Operation depends on the network and implementation. Control may not be available when the phone and controller cannot communicate over the configured network or service. A basic relay-based system does not automatically provide energy monitoring, load-state feedback, or backup operation.

14. FUTURE SCOPE

Possible improvements include authenticated internet access, voice control, scheduling, energy measurement, status feedback, fault alerts, and a compact PCB. Additional channels may support a six-switch room setup after verifying controller input/output capacity, relay ratings, and safe wiring.

15. CONCLUSION

This paper describes the proposed Smart Wireless Automation System for combining mobile wireless control with conventional physical switches. A Wi-Fi-enabled controller can operate relay channels for loads such as a fan and tube light. The design is suitable as an educational project concept; however, the final paper should include verified hardware details, photographs of the actual prototype, and genuine experimental observations before

journal submission.

SUGGESTED PROTOTYPE TEST RECORD

Test	Observation / measured result
Mobile ON/OFF for tube light	To be completed after testing
Mobile ON/OFF for fan	To be completed after testing
Manual switch operation	To be completed after testing
Mobile/manual state consistency	To be completed after testing
Wi-Fi interruption/reconnection	To be completed after testing
Measured response time	To be measured; do not estimate

REFERENCES

- [1] Espressif Systems, “ESP8266EX Datasheet,” official technical documentation. Available: https://documentation.espressif.com/0a-esp8266ex_datasheet_en.html
- [2] Arduino, “WiFi Network — Arduino Documentation.” Available: <https://docs.arduino.cc/language-reference/funktionen/wifi/wificlass/>
- [3] Arduino, “Arduino Documentation.” Available: <https://docs.arduino.cc/>

Submission note: This is a formatted research-paper draft, not proof of acceptance or publication. Confirm references match the actual hardware/software; add verified implementation details, genuine prototype photographs, and measured test results before submission.