

Project Analysis: Smart Home Automation System

1. **Project Overview**

The Smart Home Automation System enables users to remotely control home appliances, manage security features, and automate daily tasks. It includes IoT integration, cloud storage, and mobile application support.

2. **Functional Requirements**

- FR1: The system must allow user registration and secure login using OTP authentication.
- FR2: Users should be able to add, remove, and rename IoT devices (e.g., lights, thermostats, smart locks).
- FR3: Devices should respond to remote commands within 2 seconds.
- FR4: The system must trigger an alarm and notify the user if unauthorized access is detected.
- FR5: Users should be able to create automation rules (e.g., "Turn off lights at 10 PM").
- FR6: System logs should store all device activities for at least 30 days.
- FR7: Voice command integration must work with Alexa and Google Assistant.

3. **Non-Functional Requirements**

- NFR1: The system should handle up to 5000 concurrent users without performance degradation.
- NFR2: Encryption (AES-256) must be used for all user data and communications.
- NFR3: API response time should not exceed 1.5 seconds for 95% of requests.
- NFR4: The mobile app should consume less than 5% battery per hour of active use.
- NFR5: Security measures must include multi-factor authentication (MFA).

4. **User Stories**

- US1: As a user, I should be able to log in securely using my email and OTP.
- US2: As a user, I want to turn my lights on and off from my mobile app.

- US3: As a user, I want to receive a security alert if someone tries to break into my house.
- US4: As a user, I want to set up an automation rule so that my thermostat adjusts temperature automatically at night.
- US5: As an admin, I want to monitor the system logs to track unusual activity.

5. ****Test Scenarios****

- TC1: Verify that a user can successfully register and log in using OTP authentication.
- TC2: Test if an IoT device can be added, renamed, and removed correctly.
- TC3: Ensure that device control commands execute within 2 seconds.
- TC4: Simulate an unauthorized access attempt and verify that an alert is generated.
- TC5: Validate that automation rules execute as expected (e.g., lights turn off at scheduled times).
- TC6: Check if system logs accurately record all activities for 30 days.
- TC7: Test Alexa and Google Assistant integration by issuing voice commands.

6. ****Conclusion****

This document outlines a structured approach to testing the Smart Home Automation System, covering functional, non-functional, and security aspects to ensure a reliable user experience.