**Test Plan for Smart Voice Lights-Hands-Free Home Automation using ESP32**

**1. Test Plan ID**

SVL-TP-001

**2. Introduction**

This test plan is for the Smart Voice Lights project, which provides hands-free home automation using the ESP32 microcontroller and VC02 offline voice recognition module. The project allows users to control household appliances via voice commands and mobile app without internet dependency.

**3. Features to be Tested**

* Voice recognition for switching appliances ON/OFF
* Relay activation based on ESP32 output
* VC02 and ESP32 communication
* Mobile-based control via Blynk app
* Voice command handling under different conditions (noise, accents, distance)

**4. Features Not to be Tested**

* Internet-based voice assistant integration (e.g., Alexa, Google Assistant)
* Cloud data storage or analytics
* Security protocols (e.g., authentication)

**5. Test Strategy**

Manual testing will be performed across different voice inputs, environments, and mobile conditions to validate system response and functionality. Both offline and Blynk-based controls will be verified for accuracy and reliability.

**6. Test Environment**

* Hardware: ESP32 microcontroller, VC02 Voice Recognition Module, 4-Channel Relay Module
* Software: Arduino IDE, Blynk IoT Mobile App (Android/iOS)
* Network: Local Wi-Fi (for Blynk testing); no internet required for offline operation

**7. Pass/Fail Criteria**

* A test case passes if the device responds correctly to the voice or app command as per the expected result.
* A test case fails if the device does not respond as expected to the given command or encounters a functional error.

**8. Risks**

* Background noise may affect voice recognition accuracy
* Hardware components (e.g., ESP32 or relay module) may malfunction or become disconnected
* Wi-Fi instability may interrupt Blynk app control during testing

**9. Approval**

**Prepared by**: [Your Name]  
**Approved by**: [Project Manager / QA Lead]