**Test Procedure Document**

**1. Testing of Components:**

*1.1 Arduino Uno:*

* Verify proper power supply to Arduino Uno.
* Test digital and analog input/output pins.
* Validate communication with connected sensors and actuators.

*1.2 NodeMCU ESP8266:*

* Ensure Wi-Fi connectivity and proper configuration.
* Test GPIO pins for sensor and actuator integration.
* Validate compatibility with the Blynk mobile app.

*1.3 Bluetooth Module (Option 1):*

* Establish a connection between Arduino Uno and the Bluetooth module.
* Test data transmission and reception reliability.
* Ensure compatibility with the Blynk mobile app through Bluetooth.

*1.4 Wi-Fi Module (Option 2):*

* Validate NodeMCU's connectivity to Wi-Fi.
* Test data transmission and reception reliability through Wi-Fi.
* Confirm compatibility with the Blynk mobile app through Wi-Fi.

*1.5 Sensors (e.g., Temperature and Humidity):*

* Verify accurate data readings.
* Test sensor response to environmental changes.
* Validate integration with the main controllers (Arduino Uno or NodeMCU).

*1.6 Actuators (e.g., LED, Fans):*

* Confirm proper on/off control.
* Validate responsiveness to commands from the main controllers.
* Test compatibility with the Blynk mobile app.

**2. Integration Testing:**

*2.1 Initial Integration:*

* Integrate Arduino Uno or NodeMCU individually with sensors and actuators.
* Validate basic functionalities, such as turning on/off lights and reading sensor data.

*2.2 Communication Module Integration:*

* Integrate Bluetooth or Wi-Fi module with the main controller.
* Test communication reliability between the main controller and the mobile app.

*2.3 Complete System Integration:*

* Connect all components (main controller, communication module, sensors, actuators).
* Validate end-to-end functionality, including remote control through the Blynk mobile app.
* Conduct stress testing to assess system robustness.

*2.4 User Interface Testing:*

* Ensure the Blynk mobile app's compatibility with both Arduino Uno and NodeMCU.
* Verify smooth navigation and responsiveness of the app.
* Test voice command functionalities if applicable.

**Conclusion:**

This test procedure ensures a thorough examination of individual components and their integration into a cohesive system. By systematically testing each element and progressively integrating them, the team aims to identify and address any issues early in the development process, ensuring a robust and reliable Smart Home Automation System.