Test design Part 1

Part 1: Hierarchical Test Plan

1. Unit Tests:

- Power Supply Tests:
  - Verify 5V power output stability
  - Test AMS1117-5 voltage conversion functionality
  - Verify SW1 switch functionality
- DHT11 Sensor Tests:
  - Confirm sensor initialization success
  - Verify temperature readings within valid range (20-40°C)
  - Verify humidity readings within valid range (20-90%)
  - Test data update frequency (2s interval)
- WS2812B LED Tests:
  - Test individual LED RGB channels
  - Verify LED brightness adjustment (0-255)
  - Test daisy-chain control of three LEDs
  - Verify color transition effects
- Bluetooth Communication Tests:
  - Test Bluetooth broadcasting and connection
  - Verify data transmission and reception
  - Test connection stability

2. Verification Tests:

- Mode Switching Functions:
  - M1 command switches to temperature control mode
  - M2 command switches to manual control mode
- Manual Control Functions:
  - C1-C5 commands for color changes
  - L000-L255 commands for brightness adjustment
  - Command response time verification
- Temperature Control Functions:
  - Below 25.5°C displays blue
  - 25.5-26.0°C displays cyan
  - 26.0-26.5°C displays green
  - 26.5-27.0°C displays yellow
  - 27.0-27.5°C displays orange
  - 27.5-28.0°C displays orange-red
  - Above 28.0°C displays red

3. Validation Tests:

- Must-Have Features:
  - Real-time temperature reading capability
  - Bluetooth control functionality
  - LED multi-color display capability
  - Brightness adjustment support
- Should-Have Features:
  - Temperature reading accuracy within ±0.5°C
  - Smooth LED color transitions
  - Stable Bluetooth connection
  - Proper LCD display functionality
- May-Have Features:
  - Custom color configuration
  - Multiple lighting effects modes

Example Test Case

Test Author: Ajay Xu, Bill Tong, Samuel Hong , Jersey Yong				
	Test Case Name:	Manual Control Mode Function Test	**Test ID #:**	TC-001
	Description:	Test the manual control mode (M2) functionality including color changes and brightness adjustments *by bluetooth*	**Type:**	□ white box R black box □ _____
Tester Information				
	Name of Tester:	Ajay Xu	**Date:**	12/03/2024
	HW/SW Version:	1.0	**Time:**	
	Setup:	*System is powered on and connected via Bluetooth, LCD displays correctly*		

STEP	Action	Expected Result	PASS	FAIL	N/A	Comments
1	Send command "M2"	LCD shows "Mode: Manual"				
2	Send command "C1"	LEDs show red color				
3	Send command "C2"	LEDs show green color				
4	Send command "L255"	LEDs at maximum brightness				
5	Send command "L128"	LEDs at 50% brightness				
6	Send command "L000"	LEDs turn off completely				
7	Send command "L255"	LEDs return to full brightness				
8	Send command "M1"	System switches to temp mode				
9						
	Overall test result:					

Example Matrix Test (for varying parameters)

Test Author: Ajay Xu, Bill Tong, Samuel Hong , Jersey Yong,				
	Test Case Name:	Temperature Control Mode Color Response	**Test ID #:**	MT-001
	Description:	Verify LED color changes according to temperature ranges in M1 mode	**Type:**	□ white box R black box □ _____
Tester Information				
	Name of Tester:	Ajay Xu	**Date:**	12/03/2024
	HW/SW Version:	1.0	**Time:**	
	Setup:	System in M1 mode, DHT11 sensor connected, brightness set to 255		

TEST	**INPUTS**(Temperature)	**EXPECTED OUTPUTS**(LED Color)	**PASS**	**FAIL**	**N/A**	**Comments**
1	24.5°C	Blue				
2	25.8°C	Cyan				
3	26.3°C	Green				
4	26.8°C	Yellow				
5	27.3°C	Orange				

6	27.8°C	Orange Red				
	Overall test result:					