

Test Plan

To test the first requirement, the OBD-II circuit should be able to successfully communicate with a 2008 Nissan Altima. A USB to serial device can be used to send commands and receive responses through a terminal such as PuTTY running on a laptop computer. The system should be able to request data and clear diagnostic codes. An oscilloscope may be required to monitor serial lines.

The second requirement can be tested by issuing the commands to read and clear trouble codes. The quantity of trouble codes present and a list of them should be successfully received and decoded. To test the user interface, tap all available buttons and ensure they function as intended. Also ensure the trouble codes are displayed as a list and can be selected for a better description.

To test the third requirement, the Bluetooth connection should be monitored as it attempts to send commands and receive data 30 times per second. This could be accomplished by printing the appropriate variables at the same rate and ensuring the values change each time.

To verify that the Bluetooth devices use version 4.0 or later for the fourth requirement, the datasheets of said devices should be checked.

The fifth requirement is tested by using a multimeter to ensure there is 12V from the car's battery, 5V after the regulator, and 3.3V after the regulator. An oscilloscope can be used to monitor the noise and ripple to ensure the power source is sufficient.

Testing the sixth requirement requires checking the screen manufacturer's datasheet to ensure all specifications are met.

To test the seventh requirement, the GUI should be thoroughly tested to ensure it can be operated with only taps or button presses.

The eighth requirement is tested by viewing the schematic of the system if a charging module is custom designed, or by viewing the datasheet from the manufacturer, to ensure a USB-C port is utilized.

To test the ninth requirement, the ESP32 could be powered by a computer and a Bluetooth connection will be established with the Raspberry Pi. With a timer, the running time will be measured with the handheld device constantly transferring Bluetooth data with the screen at full brightness. To ensure the rechargeable battery includes proper protection and charging circuitry, check the datasheet.

Testing the tenth requirement involves watching the user interface and verifying the battery percentage falls accurately as the device stays powered. The status should be 100% at full charge, and the device should power off once the percentage reaches 0.

To test the eleventh requirement, verify there are buttons to adjust the brightness in 10% increments. Tap these buttons and ensure the brightness changes accordingly each time.

The twelfth requirement can be tested by pressing the power switch when the device is off and ensuring it boots up, as well as pressing the power switch when the device is on and ensuring it shuts down.

Zak Rowland

The thirteenth requirement can be tested by checking the schematics to ensure either a single board computer or microcontroller is used in the system.

The last requirement can be tested by viewing the GitHub repository and verifying all documentation and code is open source.