



HARMAN TEST AUTOMATION FRAMEWORK

Automating Testing for Connected Car Displays

Cars today have more than 100 built-in or installed Electronic Control Units (ECUs) and over 10,000,000 lines of software programming. Luxury cars like BMW 7-series models have as many as 150 ECUs that control and regulate the functions of the car. The Infotainment system and the Digital cluster are the top two complex ECUs in a vehicle. While the number and complexity of ECUs in vehicles are ever increasing, there is constant pressure on manufacturers to ensure that ECU software is safe and reliable, is released on time and does not result in expensive vehicle recalls.

Test automation helps automakers identify critical software errors well in advance of the software release. Test automation is required to simulate conditions which occur very infrequently (in the order of 1 in 10,000 trials), but are a threat to safety. Test automation reduces manual labor and enables the testing personnel to focus on identifying more challenging test cases and leaves the mundane testing to be performed by the Test Automation Framework. This type of testing also ensures reproducibility of test conditions and test case failures, thereby enabling an easy method of identifying the root cause of the errors.

The framework can be used on Automotive Infotainment Systems across phases such as Software integration, Software qualification, System integration and System test. The approach can be applied to all features in an advanced infotainment system. The framework develops a smart, simple and an intuitive method for writing test cases with no dependency on scripting and/or programming skills. It offers support to define a detailed test reporting mechanism as an outcome of automated text execution.

Top-line Benefits

- Automated test setup without any additional investment on test tools or test hardware
- Useful to reproduce test case failures
- Automated overnight test capability
- Very little ramp up time to install, understand and use
- Saves interoperability cycle time (3 to 4 mobile devices can be tested overnight)
- Feasible for long run test case execution
- Effective utilization of limited target boards
- Find issues which cannot be caught manually
- Measures and reports performance for each test case

Why HARMAN?

Shortening Time-to-Market

Shorten your time from concept to delivery using our best practices, turn-key delivery models and rich talent pool.

Cross-platform

Take advantage of our experience in multiple industry verticals and leading platforms to rapidly exploit new market opportunities.

Global delivery footprint

Our skilled, talented engineers deliver solutions to companies like yours from centers throughout the world.

Solution accelerators

Get access to leading edge innovation and best practice by using our solution accelerators and global pool of partnerships.

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Capabilities and Benefits

Vision and Object based HMI Validation	OCR and Text match, Object match, Pixel to pixel comparison, Crop and compare
Audio validation	<ul style="list-style-type: none">• Audio Capture and compare• Verification based on Audio properties
Log validation	Parse and validate based on tokens and specific protocol messages
Industry-grade Test database	<ul style="list-style-type: none">• Test cases database for testing across 20+ OEMs• Support for over 20,000 Test cases
Test script generation tool	<ul style="list-style-type: none">• GUI based approach to develop test scripts efficiently• Platform independent
Project configuration	<ul style="list-style-type: none">• Choice of the Target configuration, Platform configuration, Input configuration, Validation configuration and Logging configuration• Configuration can be saved to enable test case developer to reuse it• Execution tester can open configuration from the test app to run the developed scripts
Input simulation	<ul style="list-style-type: none">• Simulation of multi-modal inputs such as VR, Touch and Hard keys• SWC control message over CAN/LIN
Vehicle simulation	<ul style="list-style-type: none">• Simulates the ignition cycle, climate control module, park assist and distance• Cranking with various voltage levels• Cluster validation• Vehicle information over the CAN and Vehicle health check
Tuner simulation	<ul style="list-style-type: none">• Integrate with specific RF Signal generator to provide support for testing all tuner features• RDS tests and signal strength control• Simulate interference noise in the signal• Multiple ensembles can be simulated to test the DAB signals for various countries
Application layer	Supports Reference application for developing OEM-specific solution covering audio analysis, image analysis, validation on log input and vehicle simulation
Core Library layer	Pre-integrated libraries including DLT, DLT App, CAN App, LIN App, MOST App, Ethernet App, Smartphone App, Framegrabber, Diagnostic App, and more

Partner with an industry expert

HARMAN (harman.com) designs and engineers connected products and solutions for automakers, consumers, and enterprises worldwide, including connected car systems, audio and visual products, enterprise automation solutions; and services supporting the Internet of Things. With leading brands including AKG®, Harman Kardon®, Infinity®, JBL®, Lexicon®, Mark Levinson® and Revel®, HARMAN is admired by audiophiles, musicians and the entertainment venues where they perform around the world. More than 50 million automobiles on the road today are equipped with HARMAN audio and connected car systems. Our software services power billions of mobile devices and systems that are connected, integrated and secure across all platforms, from work and home to car and mobile. HARMAN has a workforce of approximately 30,000 people across the Americas, Europe, and Asia. In March 2017, HARMAN became a wholly-owned subsidiary of Samsung Electronics Co., Ltd.

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