

Title of Paper

Offshore Automotive Systems Testing: Test Automation Example

Presenter

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Instructional Level

Introductory Intermediate Advanced

Target Group

Test practitioners and engineers, Software and Test managers

Keywords

- Testing Embedded Software and Systems
 - Test Automation, Model based Development, Model Based Validation
 - Automotive
 - Offshore Projects
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Abstract

The increasing complexity nevertheless modularity of embedded systems in the field of automotive industry calls for standardization and Automation Techniques for both Software Design and Software Testing, that support specialization (Resulting in higher maturity, and efficiency) without abandonment of reusability (Resulting in decreasing Time to Market).

This presentation deals with this issue in the scope of Validation Testing, which is situated on the critical path to product introduction. Test Automation is used, for instance, to minimize the time needed for test execution. However, Test Automation can be profitable in terms of Time, Money, and –if correctly managed– Quality.

The presentation handles the implementation of Standardization, and test Automation ideas and methodologies on a HIL (Hardware in the loop) In-House validation Tools used in a Program (The Term Program in the Project Management sense is a pool of projects directed towards a common goal) that contains Projects with the scope of validation. The program has started in mid 2006, and aims for providing expertise, and performing Validation Testing for diverse set of products at various domains in Automotive Industry using generic tools, following a standard and efficient methodology that ensures the maximum re-usability while maintaining high maturity.

The approach demonstrates a standardized modular test system that includes methodology for requirements development, test cases representation, test cases execution, results analysis and reporting.

It has been worked-on starting with a basic automation of test execution following Kaizen principle (Improvement in small yet continuous and consistent) on various projects including validation of several products in the field of automotive industry in the driver's assistance domain, and is still developing to reach the target of having an output of generic validation tool and methodology for system and software validation in the automotive sector.

The Challenges were (some of them were handled, others still in the process):

- Non Standard Illustration, Terminology, Complexity, and Maturity of Software Requirements.
- Software Requirements (functional and non-functional) crosscut, in some cases, the entire system software.
- Offshore managing both the Design & Testing sides of the V-Model apart from each other.
- Changes in the system, design, and requirements are common and are also a threat to the usability of the automated tests.

The Benefits that were foreseen from such an improvement project are:

- Methodology for having a standard Software Requirements despite the product/domain.
- Spread of best practices and competencies –through re-use of marking scheme components and development of common COTs (Components of the shelf) for each validated product models.
- Single System, yet generic (through minimal changes) for Generation and Measurement of all Input and Output Signals of the system in addition to providing Testing functionalities specific for each System under Test.
- Modular test system that can -with minimal changes- be programmed to simulate the system under test functionalities to be able to literally running the real system without having the real System.
- System for handling Test Cases until Execution until Comparison of the measured values with the Set points.
- Confidence in the result; A fully auditable result – assessment information is built up systematically and all results are logged by the support tools as they are generated. These are then available for presentation, reporting and response to challenge.

Lessons learned are:

- Requirements Development for maintainability; to maximize maintainability, flexibility and ease of use, some requirements development constraints had to be made.

Next Step is to finalize the Model Based Development Validation, and Requirements standardization, then explores the implementation of Model Based Testing targeting automating the generation of test cases from a system model. Model Based Validation is technically superior to conventional scripted testing; however there have always been difficulties in deploying this methodology in large scale industrial context.

Foreseen Future Challenges for next steps:

- Ensure that Functional model meets all the actual requirements as the model will be validated not the real system, so this is very critical.

Formalized Validation is required for the model against the requirementsx

Biography

Name: Sherif Nour Eldin

Actual working for IBM, based in Cairo, Egypt

Title: Staff Software Engineer

Role: Validation Technical Lead

Sherif Nour Eldin has a total of 7 years experience in the field of Mechatronics Systems; Thereof:

- 1.5 years in Team Leading and Project Management Activities in the field of embedded Software and Validation for Automotive Industry.
- 2 years in Programming, Verification, and Validation of eSW. Mainly in the domain of Driver Assistance Systems for Automotive Field.
- 2.5 years in Modeling, Simulation, and Control. Mainly in the field of Electrical Motors & Electromechanical Drives, and lecturing Electrical Drives in University of Paderborn, Germany.
- 1 year in Maintenance & Production-Parameters Controlling in the field of medical industry.

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