

TOPIC 3: Model-based testing of embedded systems

1) The Problem

All European car manufacturers face the problem of attempting to test embedded systems in a networked architecture. This task gains importance with the development of safety critical x-by-wire technology. Current practice is based upon the manual development of test procedures which leads to the following problems;

- High cost of the manual generation of test cases for a large number of system variants
- No re-use of the test engineer's work for other projects
- No guarantee for coverage of test cases
- Risk of incompleteness in particular for distributed architectures
- No automatic linking of requirements and versions to the test procedures

2) Industrial Requirements

To address these problems, computer support or automation of the test generation process is required. In detail, this means;

- Automatic suggestion of tests
- Handling of variants and re-use of previous work
- A standardised, formal description of system specifications as a basis
- An interface to requirement management tools
- Ensuring coverage and minimality of sets test cases
- Support for testing of networked architectures
- Easy-to-use tooling
- Traceability through the whole development process

3) Foreseen Solution

The solution exploits model-based technology. In this case, the model represents the system specification and is used to automatically generate test cases that check the monitored system behaviour against the specification. This includes;

- Import of requirement specifications from other tools
- The generation of a model from the requirement specification, for both general and system-specific requirements
- The aggregation of subsystem models and a communication model into a model of a network
- The automated generation of test cases covering all relevant potential faults from this model
- Algorithms for minimizing the number / costs of test cases
- The automatic application of the test cases and the interpretation of their results

4) Benefits

A successful result will improve competitiveness of European industries (not confined to automotive industries) due to

- Reduced time and costs for test generation
- Reduced time and costs for testing
- More reliable and safer systems
- Reduced time to market

5) Type of Project / Potential consortium

STReP

AUDI, SEAT, BMW, ROSE, OCC'M, etc.

+ Academics (U. Paris, U. Torino, U. Aberystwyth, TU Munich, etc.)

6) Relevant Objectives of the Call

Main research domain is SURFACE TRANSPORT - GOAL 2.2.

Secondary links are

SURFACE TRANSPORT - GOAL 2.1, 4.13

IST: E-safety