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SIL TEST ENVIRONMENT FOR AUTOSAR

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SIL TEST ENVIRONMENT FOR AUTOSAR SOFTWARE COMPONENTS BASED ON A C-PARSER

Technical task:

The task of the technical innovation is to reduce the complexity of code generation for SIL test environment for AUTOSAR software components.

Initial situation:

AUTOSAR software components (SWCs) can be tested as „software in the loop“ (SIL) by first generating the AUTOSAR RTE („runtime environment“) based on the ARXML format description of the SWC from a code generator, wherein the C functions of the RTE stubs are, ie no code or only default return values included. Subsequently, these RTE functions must be extended with code that simulates the behavior of the RTE functions suitable for the desired test cases. The test cases are e.g. programmed and executed using a test framework. The ARUnit project also offers the generation of RTEs based on mocks instead of stubs.

The required RTE code generator is a very complex software that must contain the entire AUTOSAR model in order to interpret the information from ARXML files. The AUTOSAR model differs for each AUTOSAR version, so the code generator for each version must be fundamentally adapted. Furthermore, software developers / testers often do not have ARXML, but only generated header files.

Solution:

The code generation of mock RTEs required for SIL testing of AUTOSAR SWCs is not based on ARXML files but on the basis of AUTOSAR header files using a C parser. Using mock-based RTEs instead of stub-based RTEs results in a separation of responsibilities because the behavioral simulation occurs in the test cases, not in the RTE. In addition, each SWC requires only one RTE, which can be used for any number of test cases. For the code generation no ARXML files are needed (These are only needed once to generate the header files and therefore not in every team, company etc.). The code generator is identical for any AUTOSAR versions unless basic things like e.g. the programming language will be adjusted. The code generator does not have to implement or know the AUTOSAR model. The complexity is considerably reduced.

A code generator based on a freely available, ready-C parser, such as a. clang and a mock framework such as GoogleMock used that out AUTOSAR header files for the SWCs associated with these header files for any test case mock RTEs generated. Test cases for these SWCs can then be programmed using a test framework such as GoogleTest or CppUnit. The generated files of the mock RTE are compiled and executed along with these test cases.

Possible application:

- SIL-Testumgebung für AUTOSAR-Softwarekomponenten.