

AUTO-CAAS: Model-Based Fault Prediction and Diagnosis of Automotive Software

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Abstract

In this presentation, we first provide an overview of the AUTO-CAAS project [1], an ongoing collaboration among ArcCore AB, Halmstad University, and Quviq AB. The aim of the project is to exploit the formal models of the automotive standard AUTOSAR [2]. These models were developed by the industrial partner of the project Quviq AB, in order to predict possible future failures in concrete implementations based on AUTOSAR components that may possibly exhibit deviations from the standard. We use a model-based technique to align the actual behaviour of component with their interface models. We then exploit the result of this analysis in order to generate targeted test-cases to push the components towards predicted failures. We also exploit this information to diagnose failures that are detected otherwise and trace them back to the model-based analysis results.

One of the first challenges in our project is to represent failures (non-conformances) of software components in a comprehensible and processable format for later failure analysis of the larger system. In this context single counter examples (failing test execution traces) are not sufficient as they do not generalise the failing behaviour, only exemplify it. To construct the more general failure description, i.e., a *failure model*, we run the tests repeatedly and employ automata learning techniques [3, 4] to build a complete model of the failure out of several failing test traces. This process is automatic in most part, however, it needs to be controlled by providing some a-priori knowledge about the system under test to guide and the learning process. The failure learning process is the second part of our presentation.

Keywords: model-based testing; test generation; automata learning; failure model; AUTOSAR

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References

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