

SCCH

Software Competence Center Hagenberg GmbH

Programme: COMET – Competence Centers for Excellent Technologies

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Crane control real and virtual (Image source: Palfinger)

AUTOMATED SEARCH FOR BUGS

INTRODUCTION OF VISUAL REGRESSION TESTS AT PALFINGER.

Palfinger is a world-renowned company for loading cranes used for loading and unloading vehicles. Their flagship product is the hydraulic knuckle boom crane, which is operated by a hydraulic system and a PLC control. For quality assurance, the system is regularly subjected to automatic tests based on a hardware-in-the-loop system.

As part of the SmarTest (Smart Software Test) research project, quality assurance was investigated in the further development of large and complex software systems that represent parts of customisable and configurable products or product lines. The aim of the project is to test and introduce

sustainable improvements and support for quality assurance measures in this environment.

Linking the physical world with the computer world

In classical mechanical engineering, software often did not have a high priority. In the meantime, however, the requirements and complexity have increased massively. With cyber-physical systems (CPS), it is becoming increasingly difficult to ensure reliability and safety as they grow larger, more complex and more heterogeneous. Although this problem is well known, the systems are growing faster than the ability to control them, which is why more sophisticated, automated testing methods are

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needed to guard against new errors caused by modifications. Regression testing enables the detection of such hidden bugs. For the successful implementation of the joint project, the well-known Gorschek model for technology transfer was followed.

Project procedure

The first step was to identify the potential areas of improvement at Palfinger based on the needs of the practitioners. In the past, crane control often had hard-to-find problems with the graphical user interface (GUI). Display errors often went unnoticed because the automatic tests did not take into account the visual representation of the GUI. The second step focused on how to access the screen content, create reference images for regression testing and compare the actual screen content with the expected screen content.

Solution

The existing test library was extended by the possibility to save the current display of the GUI as

reference images for a later comparison.

Furthermore, the comparison option was extended to select any rectangular image section for the comparison in order to be able to ignore dynamic content, such as the display of the current time, for the comparison.

Result

Through the successful implementation of the test approach of visual regression tests for the virtualised crane control and its integration into the test pipeline, the basis for safeguarding the graphical user interface against future undesired changes could be laid.

In addition, the special challenges of application-oriented research projects in the context of CPS for a successful technology transfer were also elicited.

Success factors

Acceptance and support by the company management and the employees are the most important success factors for such cooperations.

Project coordination (Story)

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Project partner

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