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Methodology and supporting toolset advancing embedded systems quality

Results in Brief

Improving embedded systems software

An EU team created tools assisting the development of embedded systems software. The tools help European small and medium-sized enterprises (SMEs) compete in the sector, improving the quality of such software created using formal description techniques (FDTs).

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Software quality is important to the development of embedded systems, which may often be used in safety-critical applications. Despite widespread use of software development tools, achieving the required quality remains challenging – particularly for SMEs that lack the necessary resources.

The EU-funded 'Methodology and supporting toolset advancing embedded systems quality' (MODUS) project aimed to help SMEs compete in the embedded systems market. The 12-member consortium aimed to develop a set of methodologies and tools that improve the quality of embedded systems when using FDTs. The tools were intended to allow model verification, interface with standard simulation platforms, performance optimisation and customisable source code generation. The project ran between October 2011 and March 2014.

Researchers achieved a system allowing use of existing model verification techniques that are dispersed across various modelling frameworks and tools. The project further developed a tool guiding selection among candidate verification techniques, using automated analysis of the input system's models and properties.

The consortium developed a methodology and tool for formal representation of coding conventions, plus a tool for customisable generation of code that respects the representations. Hence, software developers can automatically acquire quality source code without having to manually reapply coding rules.

A further project tool for performance optimisation facilitates improvement of algorithm complexity in software design, and is applicable across various platforms. The team's approach, in combination with its code generation tools, allows easy creation of optimised source code.

The MODUS project produced development tools enabling European SMEs to compete against larger companies in terms of embedded systems software. The developments also offer commercial opportunity.

Keywords

Embedded systems | formal description techniques | software development | source code generation | software design

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MODUS

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