

From: <ulf.h.hammar@se.abb.com>
To: <yi@Minsk.DoCS.UU.SE>
Cc: <tomas.lindstrom@se.abb.com>
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Subject: Official statement to ARTES

> Alexandre David, a PhD student at Uppsala University, has carried out a
> work for us at ABB Automation Products. The work involved a modelling and
> formal verification of parts of one of our fieldbus protocols. The tool
> UPPAAL was used. The work was very successful in a number of ways:
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> - The model was easily comprehended and gave a good picture of the
> functionality of the protocol
> - Execution traces, e.g. verification results, were easily comprehended and
> gave a good illustration of the flow of events in specific situations in
> the protocol
> - The UPPAAL tool was easy to use and well suited for this type of
> problems. Some of the modelling methods were not so obvious for a newcomer,
> but it was easy to understand and evaluate the models that were created.
> - Alexandre was very observative and got a very good understanding of the
> functionality of the protocol.
> - By this work Alexandre (probably?) got a better understanding of the
> problems and priorities in the industry.
> - It was possible to focus the model on the relevant parts of the code and
> to extend it to the desired level of complexity. This was thanks to the
> combination of the flexibility of the methods/the tool and Alexandre's good
> understanding of the protocol.
> - Previously unknown peculiarities and some weaknesses of the protocol and
> the code were found.
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> The method and the tool have limitations with regard to the state-space
> explosion. This was notable but managable. It caused some extra efforts but
> inflicted in reality no disadvantage. A problem was that it was not so
> trivial to evaluate if errors, that the model verifications pointed out,
> were due to problems in the protocol or in the model. This required a very
> good understanding of both the protocol and the models.
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> It is now our intent to try to include UPPAAL in our organization and work
> with it on a regular basis. This is however not trivial. Functions for
> automatic code generation and "round trip engineering" are desirable and
> also a standardized syntax (UML) and file handling.
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> The excellent and unique model verification function of UPPAAL is useful in
> our software development and it is our hope that we can utilize it in the
> future to increase our technology level.
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> Ulf Hammar, Tomas Lindström
> ABB Automation Products
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