Using Artificial Intelligence and Learning to direct Stimuli Generation in Functional Verification: Learning-based test generation (supported by Infineon Technologies UK Ltd)

Type of award  PhD Research Studentship

Department  Computer Science

Scholarship Details  Scholarship covers full UK/EU (EU applicants who have been resident in the UK for 3 years prior to application) PhD tuition fees and a tax-free stipend at the current RCUK rate (£14,296 in 2016/17, £14,553 in 2017/18), enhanced by an additional industrial top-up subject to contracts. EU nationals resident in the EU may also apply but will qualify only for PhD tuition fees

Duration  3.5 years

Eligibility  Home/EU applicants only

Deadline  Must be able to start mid-September 2017

PhD Topic Background/Description

Functional verification ensures the correct functioning of complex semiconductors. Companies invest heavily in functional verification, e.g. to ensure a good user experience, to comply with regulators, to avoid the considerable costs of recalls and litigation and, in safety critical applications, to prevent the loss of life.

The two state-of-the-art approaches to functional verification are constrained-random verification and formal verification. The former is inefficient, with many simulation cycles spent exploring the same state space in much the same way; guiding the tool into the interesting corner cases present in complex systems typically requires considerable input from engineers. On the other hand, formal verification can find corner cases with little manual steering, but complexity limits mean that it can only be applied exhaustively to relatively small designs.

We aim to use advanced learning to direct the generation of stimuli so that the interesting corner cases on a large complex design can be reached in an automated way. In this project we intend to employ statistics-based learning techniques to help find correlations between observed coverage and stimulus. In particular, we will investigate statistical techniques capable of uncertainty propagation to predict the likelihood of given stimulus to achieve verification goals. This information is expected to help direct stimulus generation in a series of iterative cycles, each refining the information available to the learner. The programme of research includes training the test generator to stay within a set of constraints, so it produces valid stimulus; training the test generator to trigger checkers in the design; and training the test generator to achieve coverage goals. Our objective is to generate otherwise hard to find input sequences and to identify complex design configurations. We expect that this significantly improves the level of automation and effectiveness of test generation.
Further Particulars

Candidate Requirements
We are looking for an enthusiastic student with at least a 2.1 or first class degree in Computer Science, Computer Systems Engineering or a similar discipline.

Excellent programming skills and a good understanding of computer architecture are essential. You are able to quickly pick up new programming languages and you are willing to learn how to use state-of-the-art professional EDA tools. You are a competent presenter, writer and communicator. You seek an intellectual challenge and aim to achieve excellence in your research.

Scholarship Details
Research Council £14,296 p.a. in 2016/17 (£14,553 p.a. in 2017/18) plus an industrial top-up (amount to be finalised) subject to contracts.

Informal enquiries
Please email Prof Kerstin Eder (Kerstin.Eder@bristol.ac.uk) or Dr Carl Ek (carlhenrik.ek@bristol.ac.uk) for general enquiries, please email gsen-pgrs@bristol.ac.uk

Application Details
To apply for this studentship submit a PhD application using our online application system [www.bristol.ac.uk/pg-howtoapply]

Please ensure that in the Funding section you tick “I would like to be considered for a funding award from the Computer Science Department” and specify the title of the scholarship in the “other” box below with the name of the supervisor.

Closing date for applications 25 May 2017.

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