Title: Testing Agents for Verification of Autonomous Systems

*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 (£14,777 in 2018/19). EU nationals resident in the EU may also apply and will only qualify for PhD tuition fees.

*Duration*  
4 years

*Eligibility*  
Home/EU

*Starting Date*  
Funding available from 1 October 2018

**PhD Topic Background/Description**

Systems are being equipped with increasing degrees of autonomy, yet we have no widely accepted method of gaining confidence that these systems are inherently safe and secure. In particular, any guarantees established for such systems at design time must be preserved during operation, even if the system adapts and learns in its target environment. Furthermore, when multiple instances of such systems are being deployed in a variety of environments, it is important that learning results can be scrutinized and, where appropriate, shared between them.

So, how can we gain confidence in the safety and security of a system that continually learns, adapts and evolves? This is the key question that this project will address and is one that must be answered, to assure and certify autonomous systems. More specifically, this project will explore the concept of agent-based testing, introducing multiple interacting agents into the test environment of autonomous systems. The use of agents for test generation Kerstin Eder 17/4/2018 17:49 Comment [1]: see https://www.ukri.org/skills/funding-forresearch-training/ allows us to exploit high-level, goal-directed planning during model-based testing. This is expected to significantly increase the effectiveness and efficiency of testing. A multi-agent test environment can continually monitor the system under test (SUT), and create interesting stimulus leading to situations that challenge the behaviour of the SUT as part of a simulation-based coverage-driven verification environment. Because testing agents can react to SUT behaviour, this approach can be applied in simulation at design, but also at runtime.

Your research will take the original, agent-based testing approach developed at the University of Bristol to challenging new application domains of significantly larger scale than the original human-robot interaction use case, both in terms of application and environment complexity. The research will be use-case driven, with applications selected from a variety of areas to increase our knowledge and understanding of the effectiveness of this technique.
Further Particulars

Candidate Requirements
A good 2.1 or first class degree in Computer Science, Computer Systems Engineering or a similar discipline is required.

Excellent programming skills are essential. It would be an advantage to have a background in at least one of the following areas: robotics simulation, simulation-based testing, formal methods, including formal modelling, formal specification and verification, model-based design or testing techniques, multi-agent systems, BDI and agent programming.
You are a competent presenter, writer and communicator, willing and able to work with our industrial collaborator.

Informal enquiries
For informal enquiries please contact Prof Kerstin Eder - Kerstin.Eder@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.

Interested candidates should apply as soon as possible; applications will be evaluated as they are submitted and once a suitable candidate has been selected the studentship will close.

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