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 scrutinised 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 intelligent, agent-based testing, introducing multiple interacting agents into the test environment of autonomous systems. The use of agents for test generation 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 time, but also during operation 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.
Candidate Requirements
A good 2:1 or first-class degree in Computer Science, Computer Systems Engineering or a similar discipline.

Essential:
Excellent programming skills.

Desirable:
A background in 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, planning, BDI and agent programming. In addition, you are a competent presenter, writer and communicator, willing and able to work with our industrial collaborator, Thales.

Scholarship Details
Research Council £14,777 p.a. in 2018/197 (£15,009 p.a. in 2019/20) plus an industrial top-up (of up to £5,000 p.a.) subject to contracts.

UK Home students are fully funded. EU students are eligible subject to meeting iCASE funding eligibility criteria (https://epsrc.ukri.org/skills/students/coll/icase/intro/).

Informal enquiries
Please email Prof Kerstin Eder (Kerstin.Eder@bristol.ac.uk)
For general enquiries, please email seem-pgr-admissions@bristol.ac.uk

Application Details
To apply for this studentship, submit a PhD application using our [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 31 July 2019.

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