Parallel Verification of Hybrid Systems

The University of Hertfordshire is situated in Hatfield, just north of London. The School of Computer Science at the University of Hertfordshire is one of the oldest Computer Science departments in the UK.

We offer a three years PhD program in the area of verification of hybrid systems under the supervision of Dr Olga Tveretina.

**Project background:** A hybrid system is a well-known model of a discrete system acting in a continuous environment. Many applications of hybrid systems, such as intelligent highway control, air traffic management to name but a few are safety critical. To formally verify safety properties one has to compute the set of reachable states and to check whether or not it intersects with the set of unsafe states. Designing faster decision procedures for reachability is an ongoing research challenge. One way to address the challenge is to augment the classical approaches by parallel composition.

Very little original work has been done in the area of parallel algorithms for the verification of hybrid systems, but even those reports are not supported by evidence of their efficiency even though they deal with extremely simple continuous dynamics. This project is concerned with both theoretical advancements of the state of the art and practical, moreover parallel, implementations of algorithms. The successful candidate will

- develop new exact and approximate parallel algorithms for verification of hybrid systems;
- implement the algorithms and test them across a set of benchmarks;
- discover new benchmarks and applications for the algorithms.

A suitable candidate will have a strong first degree related to Computer Science or Mathematics and is expected to have:

- strong analytical skills and solid background in linear algebra and differential equations;
- proficiency in at least one programming language, such as C, C++, Java, Python;
- experience in parallel programming.

A successful candidate is eligible for studentship about 14,000 per annum. The planned start is October 2017, subject to negotiation. The deadline for applications is 16th June 2017.

Please contact Dr Olga Tveretina (o.tveretina [at] herts.ac.uk) if you have any questions related to the research area or the application procedure.