

Aquitaine –Karnataka collaboration Scientific Project for Pre-PhD student exchange

Scientific Proposal

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| Project Title | Verification of Real-Time Systems with Many States |
| Scientific domain | Computer science |
| Summary (ca. 10 lines) | <p>Timed Automata are widely used to model cyber-physical systems working under timing constraints. Such models are often used to verify correctness of a system: a desired correctness property is verified using an automatic tool exploring the state space of the model. The presence of the time aspect makes such an exploration particularly tricky. The current algorithms used in tools need to store explicitly all the discrete state of the system. Unfortunately, in many real-life situations this is impossible since the models are just too big.</p> <p>The goal of this project is to design and implement new algorithms for verification of timed automata aiming at systems with many states and few real-time constraints. These algorithms will use modern symbolic representations of the state space of the system. The algorithms will be implemented in our verification software TChecker.</p> |
| Student profile wished | Master degree in Computer Science with background in formal methods (logic, automata, verification,...) and good programming skills (C++) |

Contact Aquitaine:

Erick Dufourc

@: e.dufourc@cbmn.u-bordeaux.fr

tél: +33 5 4000 6818

Contact Karnataka:

Dipankar das Sarma

@: sarma@sscu.iisc.ernet.in

tél: +91 80 2293 2945

<http://www.cbmn.u-bordeaux.fr/aquitaine-karnataka-exchange?lang=2>



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| Supervisor Name | Frédéric Herbreteau / Igor Walukiewicz |
| Supervisor @ & phone | @: fh@labri.fr / +33 5 40 00 33 36 |
| Institute/laboratory/industry (full address) | LaBRI 351, cours de la Libération F-33405 Talence cedex FRANCE |
| Director Name Institute/laboratory/industry | Pascal Weil |
| Director Institute/laboratory/industry @ & phone | @: direction@labri.fr / +33 5 40 00 69 00 |
| Timing & duration for project (give approximate ranges) | Fall semester 2015 (September-December) |
| Representative References | R. Alur and D. L. Dill, A Theory of Timed Automata, Theoretical Computer Science, 126(2), 183-235, 1994. J. R. Burch, E. M. Clarke, K. L. McMillan, D. L. Dill and L. J. Hwang, Symbolic Model-Checking: 10^{20} States and Beyond, Inf. Comput., 98(2), 142-170, 1992. F. Herbreteau, D. Kini, B. Srivathsan and I. Walukiewicz, Using non-convex approximations for efficient analysis of timed automata, FSTTCS, 2011. F. Herbreteau, B. Srivathsan and I. Walukiewicz, Better Abstractions for Timed Automata, LICS, 2012. F. Herbreteau., B. Srivathsan and I. Walukiewicz, Lazy abstractions for Timed Automata, CAV, 2013. |

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