Alur, Rajeev; **Fix, Limor**; **Henzinger, Thomas A.**

Event-clock automata: a determinizable class of timed automata. (English) Zbl 0912.68132

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Summary: We introduce event-recording automata. An event-recording automaton is a timed automaton that contains, for every event a, a clock that records the time of the last occurrence of a. The class of event-recording automata is, on one hand, expressive enough to model (finite) timed transition systems and, on the other hand, determinizable and closed under all boolean operations. As a result, the language-inclusion problem is decidable for event-recording automata. We present a translation from timed transition systems to event-recording automata, which leads to an algorithm for checking if two timed transition systems have the same set of timed behaviors. We also consider event-predicting automata, which contain clocks that predict the time of the next occurrence of an event. The class of event-clock automata, which contain both event-recording and event-predicting clocks, is a suitable specification language for real-time properties. We provide an algorithm for checking if a timed automaton meets a specification that is given as an event-clock automaton.

MSC:

68Q60 Specification and verification (program logics, model checking, etc.)
68Q45 Formal languages and automata

Keywords:

formal verification; automata theory; real-time systems; timed automata

Software:

Kronos; Uppaal

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