**UPPAAL, A Solution to Real Time Embedded System Pre-Design Performance Analysis**

Abstract

Embedded system design consists of both hardware and software with complexity varies from low, with a single microcontroller chip, to very high with multiple units of interconnection of individual microcontroller chips to form distributed embedded systems integrated with software. The design of embedded system is quiet demanding and the designer finds it difficult to embark on its actual realisation without pre-design simulation, modelling and verification. This allows analyzing essential performance characteristics of a system design at an early phase and consequently supports the choice of important design decisions before much time and resources are invested in detailed implementation. This paper presents an overview of UPPAAL, a model checking algorithms that are based on sets of clock constraints rather than on explicit sets of regions, its usage and application. UPPAAL is a tool suite for symbolic model checking of real-time embedded system predesign analysis. UPPAAL has been applied to several industrial case studies such as real-time protocols, multi-media synchronization protocols and also to communication protocols for example in multimedia applications. The model-checker UPPAAL is based on the theory of timed automata and its modelling language offers additional features such as bounded integer variables and urgency.