

I have spent a month on a research stay at the National University of Singapore in the group of P.S. Thiagarajan. I have mainly worked on the synthesis of time bounds for Timed Petri Net models there. Other research topics were scheduling with quality of service requirements and schedulability with the processor availability information.

The synthesis problem for Timed Petri Nets I have studied there was motivated by the design of the integrated circuits, where the timing constraints become a key issue. From the theoretical point of view, the hope

for a synthesis algorithm was based on a recent paper by Madhusudan, Thiagarajan, and Yang (P. Madhusudan, P.S. Thiagarajan and Shaofa Yang, The

MSO Theory of Connectedly Communicating Processes, FSTTCS'05). The authors identify a class of distributed systems for which the controller synthesis problem is computable in this paper (otherwise, the controller synthesis problem is not computable for many distributed systems). The goal was to show that a new notion of K-fairness gives us a property making timing constraints synthesis computable. However, it turned out that this notion is

not sufficient and we would need a stronger notion.

Other research directions I have met in Singapore are formal analysis of hybrid systems and scheduling. The motivation for the research in formal analysis of hybrid systems is that the current models enable for behaviours which are unrealistically detailed. Therefore, the goal is to limit these behaviours while preserving a reasonable modeling power. Results of this research have been recently published in several papers at HSCC conference (e.g., Manindra Agrawal, Frank Stephan, P.S. Thiagarajan and Shaofa Yang, Behavioural Approximations for Restricted Linear Differential Hybrid Automata, HSCC'06).

A novel method for scheduling investigated in Singapore is to transfer methods and results from the electrical engineering community, namely analysis of systems using arrival curves. The research group has defined a new class of discrete time automata - event count automata - which extends the notion of the arrival curves with state information. This approach is being experimentally evaluated for quality of service scheduling for multimedia streams. The seminal paper introducing event count automata is Samarjit Chakraborty, Thi Xuan Linh Phan, and P.S. Thiagarajan, Event Count Automata: A State-based Model for Stream Processing Systems, RTSS'05.