Prakash Chandrasekaran

"Applying Formal Methods in Model Based Design, and Concurrency issues in Asynchronous Components."

My primary research interest is applying formal models to building framework for designing concurrent communicating systems, with asynchronous behavior. In particular, my focus is in the development of formal models with rich visual notation targeting Model Driven Design and Development. I'm also interested in the complementary aspect of high level programming models for asynchronous systems and the concurrency issues that arise in these systems. As a natural extension, my interests extend to the problem of component synthesis as well. Especially, the synthesis of interface adapters (eg. device drivers) from interface specification of other communicating components. In this context, areas like Model Based Integration also become of interest for research.

In my post-doctoral work at CEA, I was working on UML based formal models and techniques for design and testing of distributed timed components under the ITEA-VERDE Project. As part of this work, I had worked on developing a framework that can provide a human friendly model for specification design, and later translate it to a concise model that would facilitate analysis and simulation.

In my earlier works, I had co-developed a formal model for asynchronous concurrent communicating systems and a programming language extension - CLARITY - for implementing asynchronous code, during my internship at Microsoft Research India. The CLARITY language, developed as an extension to 'C' provides constructs that allows asynchronous actions to be coded in a single sequential block by introducing new constructs.

The core of my doctoral work has been focussed on formal models with a human-friendly visual notation. I had then, developed a formalism for describing asynchronous components that complements the CLARITY language in the world of formal models. One of my personal research goals is to extend the formal model I had already developed to be able to formally model and specify CLARITY programs (at a high-level).

Thus said, to summarize, my research goals for the next five years, is to develop a framework, with a strong foundation in formal methods and techniques, for Model Based Design and Synthesis for a chosen domain. This will involve developing a visual modelling language, that incorporates the state of the art techniques in formal methods, with automated verification and (semi-)automated synthesis. The formal modelling framework will allow for both the design of the system, and its specification. I am open to both working on the low-level targets like embedded/control systems and on high level targets like event-driven software, as this choice is very much linked to the collaborators I would have in future, and their expertise.

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