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I am a researcher at Microsoft Research, Redmond, WA. Before joining Microsoft in May 2004, I was a research staff member at Palo Alto Research Center (formerly Xerox PARC). I received my B.E. ('93) and M.E. ('96) degrees in Automation from Tsinghua University, Beijing, China, and M.S. ('98) and Ph.D. ('01) degrees in EECS from University of California, Berkeley. I have received Leon. O. Chua award from EECS, UC Berkeley for excellent research and Technology Advance award from PARC.

My research interests are in computing systems that engage the physical world, such as sensor networks and real-time control systems. I have been working on actor-oriented design methodologies, a framework theory, modeling and simulation for heterogeneous dynamical systems, and programming models for networked embedded systems. Currently, I am leading the research efforts on service-oriented sensor-rich information systems at MSR. Working with my colleagues, we are defining the architectures, models and algorithms for service-oriented sensor networks, and are designing research software platforms and tools for integrating sensor-rich information with enterprise and Internet applications.

My experiences with computer-aided multi-paradigm modeling (CAMPaM) started from modeling and simulation of hybrid and mixed signal systems in an actor-oriented design framework – Ptolemy II. I studied denotation semantics for those systems based on the tagged-signal model and conditions for avoiding Zeno behavior which is a modeling artifact in discrete systems. Using the denotation semantics we were able to show the correctness of some existing simulation strategies, such as multi-iteration commitment with rollback. I my PhD dissertation, I proposed a framework theory that uses a notion of coarse-grained atomicity, called *precise reaction*, as a means to analyze compositionality of various models of computation. We systematically looked at continuous-time, discrete event, finite-state machine, timed multitasking, process network, and dataflow models and show why some of them are easier to compose while others not.

After joining PARC in 2001, I worked in the field of wireless sensor networks. I promote actor-orientation not only as a modeling technique, but also as a programming abstraction and runtime software architecture. Working with Elaine Choeng, we designed a TinyGALS programming model and galsC language to introduce a well structured concurrency model in resource constrained embedded sensors. To scale up design in collaborative sensor information processing applications, such as target detection and tracking, I proposed a state-centric abstraction for sensor network algorithms and the notion of models of collaboration as higher-level models that coordinate software agents.

At MSR, I am continuing the research on programming models to tame complexities in networked embedded system design. Some research directions are: how to model uncertainty in both system platforms and sensor information to perform design optimization and runtime adaptation; how to design rich component/services interfaces and composition mechanisms to capture resource constraints and runtime behaviors; and how to effectively integrate networked embedded systems as part of the global IT infrastructures.