Message-based communication is an increasingly common interaction mechanism used in concurrent and distributed systems where components interact with each other by sending and receiving messages. It is well-known that automatic analysis (verification) of systems which use asynchronous message-based communication with unbounded FIFO queues is undecidable even when the component behaviors are expressed using finite state machines. In this talk, I will discuss our recent work on identifying a subclass of asynchronous systems (referred to as synchronizable systems) for which the verification problem is decidable. I will also present the problem of realizability of asynchronous systems from regular specifications and show that the decidability of the realizability problem directly depends on the synchronizability of systems.

Samik Basu is Associate Professor and Director of the Software Engineering Program at Iowa State University, with a joint appointment with the Department of Computer Science and the Department of Electrical & Computer Engineering. His research work is in formal methods in specification and verification of systems.

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